

Mini Combat Trauma Patient Simulation System Defense Acquisition Challenge Program (DACP)

Mini Combat Trauma Patient Simulation (Mini CTPS)

Final Report

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Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE 2004		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Mini Combat Trauma Patient Simulation System Defense Acquisition Challenge Program (DACP): Mini Combat Trauma Patient Simulation (Mini CTPS)				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army RDECOM 12423 Research Parkway Orlando, FL				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 95	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Background

The following background information is included as a convenience for the reader. For a summary of work executed during this contract period, please refer directly to the Summary of Work in Progress section of this report.

CTPS is the only Distributed Interactive Simulation system in existence. It is an integrated, distributed, interactive simulation system that mirrors the footprint of military medicine. It consists of networked realistic casualty generators, patient simulators and computer-based casualty simulations, virtual patients and equipment, data and sensor recorders, and an After-Action Review System. Other types of war-fighting simulations and medical simulations, including surgical simulations can be incorporated into the system. It simulates single, multiple, or mass casualties and provides realistic representation of Battlefield Medical Resource Management. It measures patient assessment and intervention, diagnosis and treatment from point of injury to post evacuation care. The purpose of the CTPS is to more realistically assess the impact of battlefield casualties, and increase soldier survivability. The system primarily consists of Commercial-off-the-shelf (COTS)/Government-off-the-shelf (GOTS) live, virtual, and constructive simulation components.

The Mini Combat Trauma Patient Simulation System (Mini CTPS), as proposed under this project, will utilize a newly developed low cost, physiologically modeled Emergency Care Simulator (ECS™) instead of the hospital-level simulators: Human Patient Simulator (HPS™). The system will provide a military medical simulation system for training, testing and evaluation. Using the ECS into a 'Mini CTPS' configuration will enhance the systems portability, affordability and ease of deployment for active forces. The Mini CTPS will consist of three (3) Emergency Care Simulators, three (3) Trauma Disaster Casualty Kits (TDCK™), and a computer control system for Triage and Casualty Handling. The TDCK is a portable unit that allows for various bleeding, secretions and hemorrhaging that is influenced by the physiological models of the patient. It includes a moulage kit for simulating fractures, lacerations, amputations, blisters and burns.

Overview

The purpose of the Defense Acquisition Challenge Program (Mini CTPS System) was to provide a newly developed low-cost physiologically modeled simulators for the Combat Trauma Patient Simulation (CTPS) program. Its capabilities include realistically assessing the impact of battlefield casualties and increase soldier survivability. It consists of networked, realistic casualty generators, patient simulators and computer-based casualty simulations, virtual patient, data sensor recorders, and an After Action Review documentation system.

The goals of this program were to:

- Simulate, replicate and assess battlefield injuries by type and category
- Monitor the movement of casualties on the battlefield
- Capture the real time of a patient diagnosis and treatment
- Compare interventions and outcomes at each military healthcare service delivery level
- Capability to interface with legacy systems

The end result of this program was the effective integration and installation of a Mini CTPS System. This will help with providing medical instructors and trainees the tool they need to evaluate performance of students thru valid, accurate medical simulations. The ending goal was a learning tool for soldiers before combat arises.

Summary

Equipment

The equipment for the Mini CTPS System was delivered in February to begin integration of the system. The Mini CTPS System was configured with (3) Emergency Care Simulators, (3) Trauma Disaster Casualty Kits (TDCK), (1) G5 and (3) Powerbooks. All other equipment was incorporated with the ECS so there were no additional computers required.

Development

METI established a Milestone Schedule to monitor project progress status. METI began developmental work on the Mini CTPS System by working on the HPS Graphical User Interface (GUI). This is the METI HPS Software Interface. This tool supports the Mac OS plug-architecture which allows the application to be easily configured every time a new software module needs to be added. This resulted in the ECS and TDCK's to be used in conjunction with the Mini CTPS System.

System Integration

The integration began with the low-fidelity Emergency Care Simulator (ECS). This was conducted using (3) Emergency Care Simulators to be integrated into a Mini CTPS System configuration with little equipment and fewer computers (workstations).

Mini CTPS Configuration

The Mini CTPS configuration expands the portability and affordability without compromising the functionality of the complete CTPS System.

The system's capabilities includes:

- Simulating, replicating and assessing battlefield injuries by type and category
- Monitoring the movement of casualties on the battlefield
- Capturing the time of patient diagnosis and treatment
- Comparing interventions and outcomes at each military healthcare service level

METI has completed all the examination and treatment actions taken through the Triage Controller. In addition to the relative benefit or harm of the various actions, it is also important for some actions to be administered in the right order.

Even though the relative benefit and harm of actions can be expressed numerically, it is insufficient to merely apply a numerical score to each action and sum them to calculate our score for the patient: A single "must-not" action should result in a failing score while leaving out a single "must" action should likewise result in a failing score; performing all must actions and no "must-not" actions and no other actions should result in a low passing score. It is not possible to achieve this result by summing a simple numerical score.

Hardware/Software Integration

As part of this process, we began the implementation of the Mini CTPS System configuration. We began by interfacing a G5 Master Control Station and a Powerbook for the Casualty Handler station with an Emergency Care Simulator. Software Engineers began the process of integrating the computers that support the lower fidelity simulator (ECS). The User Interface for the Casualty Handler was incorporated from what had been completed in CTPS Phase 6.

The Mini CTPS System has the new version of the PCBPS and Waveform Display. METI officially released HPS v6.3 and Waveform Display v2.1.1 after two months of intensive internal and external evaluation. METI installed the official release of 6.3 software in conjunction with the CTPS software on Mini CTPS System that was delivered.

HPS v6.3 software introduces several new enhancements to the performance of the software and to the User Interface. METI intended to make the HPS software more easier to learn, easier to use, and faster to navigate (Figure 1.).

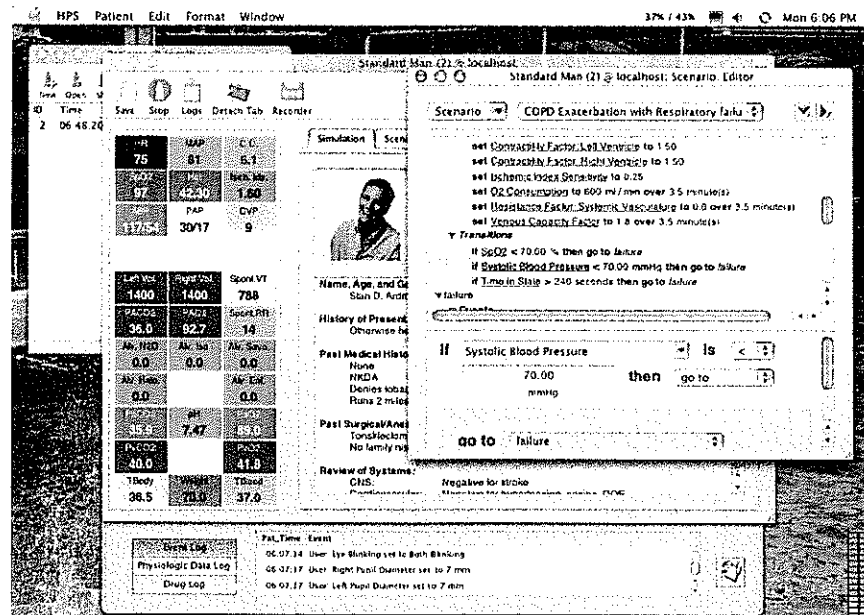


Figure 1. New HPS v6.3 Software

Software enhancements to the 6.3 software also include:

Patient Palette

As Patient Palette software is launched, its function now allows you to have a toolbar with all common operations that were previously in the individual menus. This helps the instructor/student get to the main operations in less time. Patients are also now displayed loading progress per patient, and the patients are now in numerical order by ID.

Patient Window

This window has also improved tremendously. The most improvement in this window is the toolbar. It now offers a quick access to the patient controls and viewing options. Drugs are now available in multiple categories with new "All Drugs" category. Instructors/students can see the patient run time on the toolbar at all times during the exercises. This will help instructors time students per scenario, per patient.

Patient Window Toolbar

Patient Window Toolbar is brand new to the 6.3 software (Figure 2). The following enhancements are as follows:

- Saving or Stopping Button - A patient is now at one click for a patient. Before there were numerous clicking steps to get to this point.
- Show Logs Button - Patient Window Toolbar also allows the window to be moved or resized to the logs are not shown off-screen or behind the “Dock”.
- Detach Tab - has now been moved to its own window. This will also save on the time of finding the functions for perform this action.
- Disconnect Button - Disconnects the patient from the simulator and also will only be enabled when a patient is connected to the simulator.
- Connections Drawer Button - This toggles the connection drawer and the window can move and/or can be resized to fit both the patient window and drawer on the screen at the same time.
- Patient Time/Controls - Toolbar can now allow for real time of the patient and also give the ability to pause, play or go forward.



Figure 2. Patient Window Toolbar

Connection/Nodes Drawer

The Connection/Nodes Drawer is an additional enhancement to the 6.3 software.

The connection drawer will slide out the right side of the patient window. This provides the same functionality as the old “Simulator Connection” window. Select the desired simulator from the list and press the “Connect” button. Once the connection process is complete the drawer will automatically close; it can also be closed at anytime by again pressing the “Connections” toolbar button. This will ultimately save on half the time of connecting to each Node.

Logs drawer and viewer

Logs can now be monitored throughout the entire review and interaction with the patient. When you select the “Logs” toolbar button the logs drawer drops down from the bottom of the patient window. The drawer will remain open until you again press the “Logs” toolbar button. This monitoring capability is effective during the running of scenarios as you can watch as the different scenario events are triggered without staying in the scenario player.

Menus

The Menus were designed from the feedback of previous customers. This was designed to simplify the main menu bar by removing un-used key combinations and menu items and moving the scenario menu to the scenario tab and improved display remote connections in the window menu. This new Menu also provides quick access to the ten most recently assessed menu. We also made opening and saving a patient easier by storing the last known user locaiton for the next time the application is run.

Scenario Player / Editor

The scenario editor/player (See Figure 3) has undergone some of the most significant changes in HPS v6.3. The biggest enhancement was moving the “Scenario” menu into the tab itself (previously in the main menu bar). This affects both the Scenario Player and Scenario Editor as the menus now reflect their individual functionality. The menu also includes an additional “Open Recent” option allowing you to select from the last ten opened/saved scenarios from either the editor or player. This allows you to quickly open a newly edited scenario in the player for review and testing.

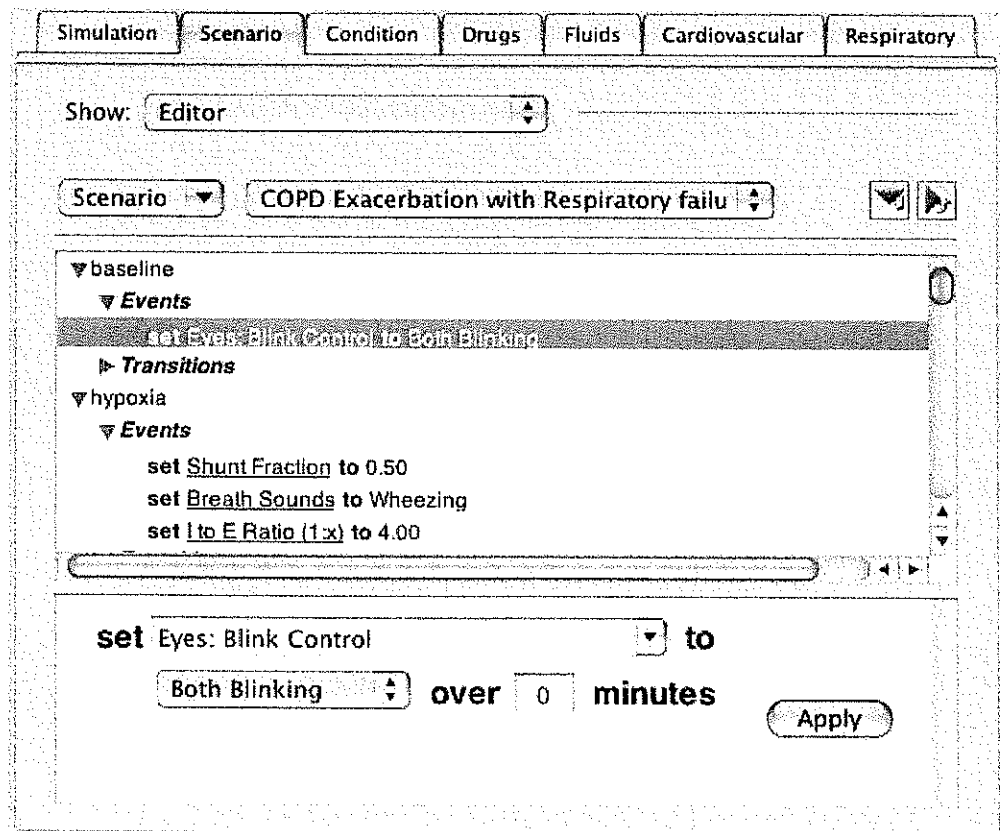


Figure 3. Scenario Player / Editor

Event Recorder Palette

Opened from the toolbar, the Event Recorder is now contained within a separate palette window and includes several enhanced features over the previous versions of HPS software. The single Event Recorder palette now handles all open patients within the one window allowing the recorded events from multiple patients to be easily added to a single scenario. Clicking on “Record” will start recording events for all running patients including those patients opened after you began recording. In addition, the recorded events of a patient do not get removed when the patient is stopped; this allows you to build a collection of events without keeping each patient open (Figure 4).

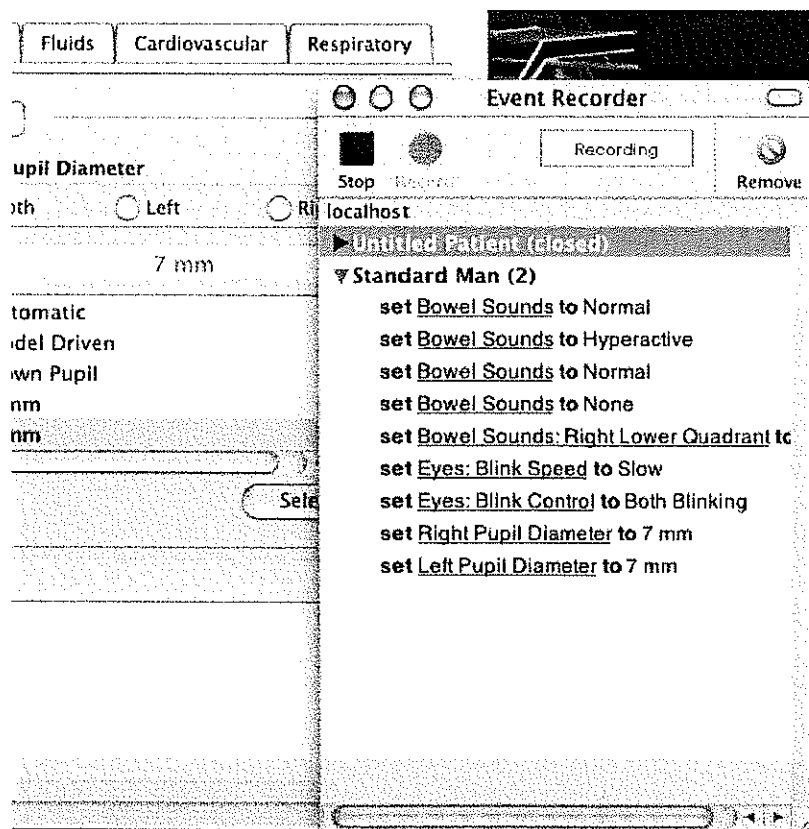


Figure 4. Event Recorder Palette

Pediatric Patients

The Pediatric Patient has now included a “New Patient” option for creating an “Untitled Pediatric Patient”. This can be accessed directly from HPS Toolbar.

- Pediatric patients now include specific drug responses designed for:
 - Atropine
 - Dobutamine
 - Epinephrine
 - Fentanyl
 - Morphine
 - Propranolol
 - Propofol
 - Sevoflurane
 - Succinylcholine
 - Thiopental
 - Vecuronium

Note: Pediatric simulation has not been added to the Mini CTPS configuration at this time.

- Pediatric patients include improved patient parameter values
 - Tidal Volumes are more representative
 - Max HR is 275 for selected supraventricular rhythms
 - Lower patient weight limits
 - Update to ‘Fixed Alveolar Sevoflurane’ UI control parameters
 - Update to ‘Functional Residual Capacity’ UI control parameters

Trauma Disaster Casualty Kit (TDCK)

During this period we also made hardware modifications to the Trauma Disaster Casualty Kit (TDCK). These modifications (1) provide a better cleaning filtration system for the customer to handle mass about of usage of the TDCK on a daily basis (2) allow any residue or particles that could be trapped into the sytem to drain before entering the manifold of the TDCK. By doing this, it results in the manifold not becoming clogged which would force the TDCK to not function. This allows for massive amounts of training with minimal clogging and other related issues (3) allow the filling of the TDCK to be cut in half. This allows for immediate replenishment of the water and does not cause any “down time” with training classes and schedules.

User Locations

USNS Mercy T-AH19 (2004 MERCEX Exercises) San Diego, California

In July, METI and RDECOM took the Mini CTPS System on the USNS Mercy for training and support during the MERCEX 2004 exercises. The Mini CTPS was set up as three stand-alone Emergency Care Simulator due to the time constraints that were given for the exercises. The staff setting consisted of physicians, nurses and corpsmen who were divided into teams with 5-7 individuals at each simulator during the exercises. The stand-alone systems were used in realistic settings with actual applications of IVs, O2, CPG, Needle Decompression and intubations exercises. The trainings were a total of 2.5 days. They did not have much opportunity for much more due to the time constraints of the exercises.

Camp Pendleton San Diego, California

In June a User Test location was designated through METI and RDECOM. The location that was chosen to house the Mini CTPS System was the Field Medical Service School at Camp Pendleton in San Diego. Camp Pendleton is the ideal location due to the fact that it is in the San Diego area, which has a very high Marine/Navy staff. It was also decided because of the strong need for medical simulation to be incorporated into the medics training needs, which is being used in the other services.

The preparation for the Mini CTPS System began in June with a building location designated to house the system. We began to coordinate the site with needed equipment and supplies before the system could be delivered and received. METI furnished Camp Pendleton a Diagram for each node location, which included electrical and networking requirements. The end result was a classroom approximately 40 X 40. METI suggested a classroom style environment for the benefit of (1) students being able to be close to trainings tools during their classes and (2) so that it would be very easy to maintain the Mini CTPS system when using the Emergency Care Simulators (ECS™) and Trauma Disaster Casualty Kits (TDCK) (Figures 5 & 6).

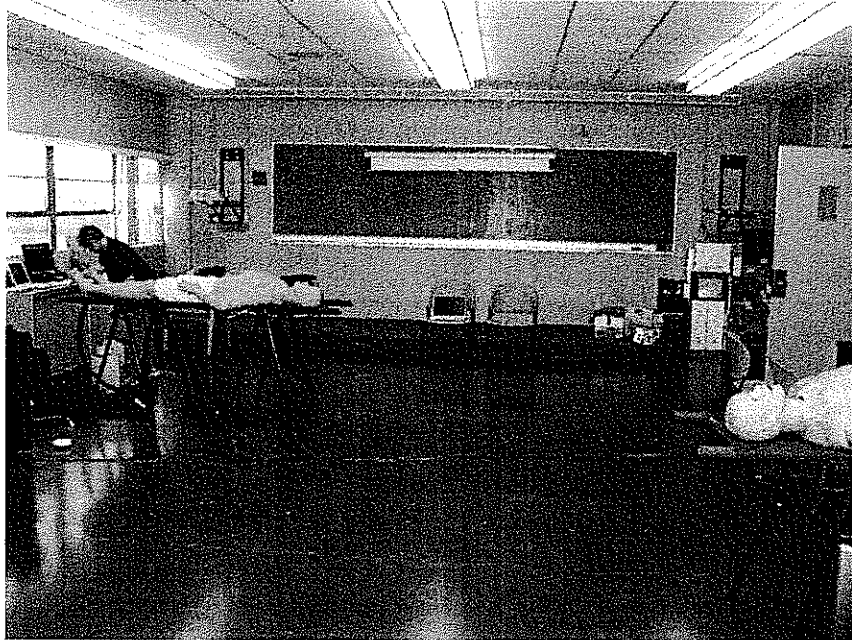


Figure 5. Room Set-up



Figure 6. Room Set-up

The Mini CTPS System was delivered in September with installation and training conducted in the October timeframe. The items delivered are as follows: (3) Emergency Care Simulators (ECS™) fully equipped with simulator operating system and Mini CTPS System components.

METI will be sending out to Camp Pendleton before the end of this current year (2004) a Video Operating System. This will enable the instructors to tape students and track the trainings for After Action Review error and class discussion.

The Installation and Training of the Mini CTPS began on October 6, 2004. The installation began just in concurrence with the first day of classes for several hundred Field Medical Service School students. Some of them had the opportunity to observe during the installation and training of the Mini CTPS System. Students were very pleased that they would be training on these simulators, more realistic training before going to battlefield zones.

Before training began, METI furnished Camp Pendleton with a Mini CTPS Training Guide Reference (Appendix B) and The Mini CTPS Training Outline (Appendix C). We just recently supplied them with the Mini CTPS User Guide (Appendix D).

METI demonstrated to Camp Pendleton a wound on the simulator using the TDCK and Moulage Kit provided for each Node station (Figure 7). This allowed Camp Pendleton to understanding how they can incorporate multiple wounds into the system scenarios. The Moulage Kit will come in very handy when students come through the training so they can properly assess the wound and provide treatment as needed (Figure 8).



Figure 7. Instructor Lt. Gino Narte with METI staff

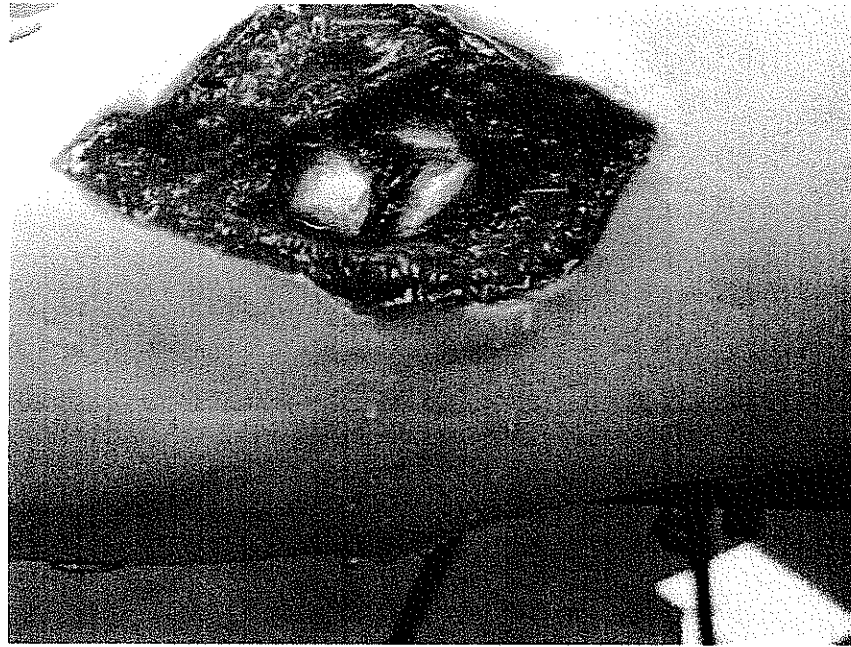


Figure 8. Arm "Laceration"

Camp Pendleton completed the evaluation paperwork of the Mini CTPS System in December (See Appendix A). The end results were very positive. Camp Pendleton finds the Mini CTPS system to be very impressive from its setup and break down to the functionality and finally the end training result. METI has already begun to see a tremendous amount of progress and initiative from Camp Pendleton. LT Narte has been in constant contact with METI's Clinical Educator, Paul Bernal, who is assisting in integrating the Mini CTPS System into their curriculum for this coming fiscal year. This is a huge milestone for Camp Pendleton since they are new to the simulation world and are trying their best to utilize the System to its fullest capacity.

Overall, the Mini CTPS System is a success. Camp Pendleton has still some internal equipment and supply issues which METI and RDECOM will continue to work with in assisting Camp Pendleton to resolve.

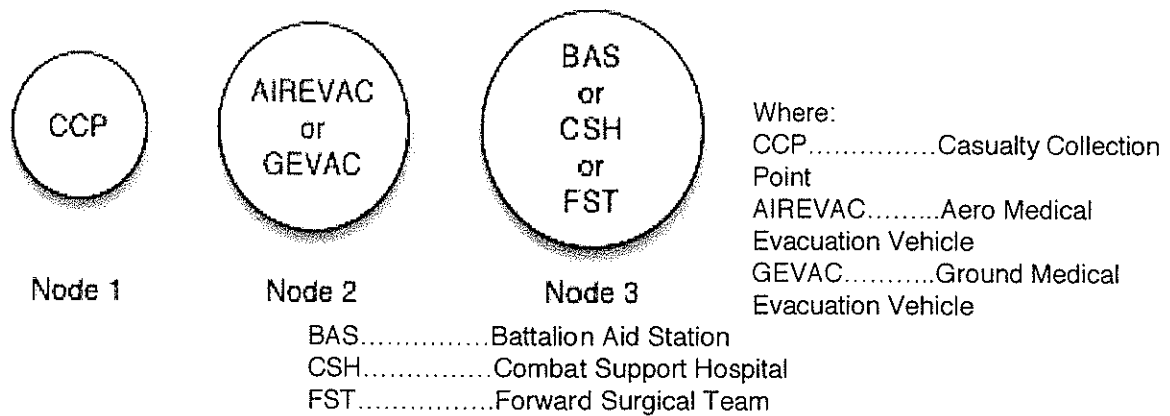
METI will continue to provide technical support to Camp Pendleton. Alyx O'Rourke (Formally known as Patricia Weaver), our METI ECS Technician will continue to support LT Narte to help with any technical issues they may have. Paul Bernal, METI's Clinical Educator is currently working with LT Narte in scenario writing, validation and also helping to work the Mini CTPS System into their current curriculum for this coming year.

Camp Pendleton, San Diego

Evaluation of Mini-CTPS System

Assessment of individual components of the Mini-CTPS system

The Mini-Combat Trauma Patient Simulation (Mini-CTPS) system is comprised of three nodes, two of which can simulate different echelons of military care.



The system has:

- Casualty Handler User Interface
- Casualty Handler Engine
- Script Player
- Script Editor
- After Action Review
- Logger

Each Node has:

- Emergency Care Simulator (ECS)
- PATSIM
- Triage Control
- Waveform Display

The maximum numbers of casualties supported on a node at any given time, based on the prescribed scenarios are:

Node	Casualties
CCP	Up to 6 casualties
GEVAC	Restricted to a maximum of 4 casualties
AIREVAC	Restricted to a maximum of 2 casualties
BAS	Up to 6 casualties
FST	Up to 6 casualties
CSH	Up to 6 casualties

Each node in the system should support, simultaneously, a casualty instantiated on the simulator while other casualties run virtually.

Below are the configurations for the Mini-CTPS system.

- | | | | | |
|-------|---|---------|---|-----|
| • CCP | - | GEVAC | - | BAS |
| • CCP | - | GEVAC | - | CSH |
| • CCP | - | GEVAC | - | FST |
| • CCP | - | AIREVAC | - | BAS |
| • CCP | - | AIREVAC | - | CSH |
| • CCP | - | AIREVAC | - | FST |

Below is a list of prescribed scenarios delivered with the Mini-CTPS system:

- Casualty with a Blunt Abdominal Injury
- Casualty with a Blunt Chest Injury
- Casualty with a Compound fracture of the left leg
- Casualty with a Gunshot wound to the left chest
- Casualty with a Gunshot wound to the right chest
- Casualty with a Closed head injury

1.1 Triage Controller:

Successfully assess multiple casualties:

Casualty Collection Point:

6 virtual casualties

☒ Pass ☐ Fail ☐ N/A

5 virtual casualties, 1 on ECS Simulator

☒ Pass ☐ Fail ☐ N/A

Ground Ambulance:

4 virtual casualties

☒ Pass ☐ Fail ☐ N/A

4 virtual casualties, 1 on ECS Simulator

☒ Pass ☐ Fail ☐ N/A

Battalion Aid Station:

6 virtual casualties

☒ Pass ☐ Fail ☐ N/A

5 virtual casualties, 1 on ECS Simulator

☒ Pass ☐ Fail ☐ N/A

Forward Surgical Team:

6 virtual casualties

☒ Pass ☐ Fail ☐ N/A

5 virtual casualties, 1 on ECS Simulator

☒ Pass ☐ Fail ☐ N/A

Air Ambulance:

2 virtual casualties

☒ Pass ☐ Fail ☐ N/A

1 virtual casualties, 1 on ECS Simulator

☒ Pass ☐ Fail ☐ N/A

Combat Support Hospital:

6 virtual casualties

☒ Pass ☐ Fail ☐ N/A

5 virtual casualties, 1 on ECS Simulator

☒ Pass ☐ Fail ☐ N/A

Allow user to successfully perform triage:

- **Examine multiple casualties, virtually**

2 simultaneous casualties

☒ Pass ☐ Fail ☐ N/A

3 simultaneous casualties

☒ Pass ☐ Fail ☐ N/A

4 simultaneous casualties

☒ Pass ☐ Fail ☐ N/A

5 simultaneous casualties

☒ Pass ☐ Fail ☐ N/A

6 simultaneous casualties

☒ Pass ☐ Fail ☐ N/A

- **Determine classification of each casualty, virtually**

Minimal	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Delayed	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Immediate	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Expectant	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Apply immediate care, virtually			
Apply tourniquet	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Apply pressure dressing	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Re-assess patient, virtually			
Airway	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Breathing	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Circulation	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Disability	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Vital Signs	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Pulse	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blood Pressure	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Respiration Rate	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Temperature	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Inspection	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Auscultation	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Palpation	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Percussion	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Successfully perform field lab tests:

Forward Surgical Team:

Chest x-ray	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Arterial blood gas analysis (ABG) pH, P _a CO ₂ , P _a O ₂ .	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

Combat Support Hospital:

Chest x-ray	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Arterial blood gas analysis (ABG) pH, P _a CO ₂ , P _a O ₂ .	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

Successfully extend the range of diagnostic and treatment options:

• Diagnostic options:

Visual presentation of patient	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Text-based patient history	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Text-based responses to evaluation questions	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Text-based descriptions of visual inspection	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Text-based descriptions of auscultation (bowel sounds)	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Text-based descriptions of palpation	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Text-based descriptions of percussion	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

• Treatment options:

Apply virtual tourniquet	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Apply virtual pressure dressing	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Forward Surgical Team:

Send patient to virtual operating room	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
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Combat Support Hospital:

Send patient to virtual operating room	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
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1.2 Emergency Care Simulator:

Capability # 1. Allow the health care provider(s) to assess clinical signs:

• Airway			
Swollen tongue	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Pharyngeal swelling	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Laryngospasm	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
• Breathing			
Spontaneous Breathing	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Chest excursion	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Airflow into oropharynx	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Airflow out of oropharynx	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
• Circulation			
Carotid pulse	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Radial pulse	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Brachial pulse	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Femoral pulse	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Pedal pulses	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Disability			
Eyes open	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Eyes close	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blinking	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Pupil dilation	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Pupil response to light stimulation	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Phonation (moaning, talking)	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Vital Signs			
Pulse	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blood pressure	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Respiration Rate	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Temperature	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Inspection			
Chest Distention	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Urinary Output	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
• Breath sounds Auscultation			
Synchronized with phases of respiration	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Left lung	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Right lung	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Normal Bilateral	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Normal Unilateral	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Abnormal Bilateral	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Abnormal Unilateral	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Capability #2. Allowed the health care provider(s) to apply diagnostic monitoring equipment:

5 lead ECG	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Invasive Blood Pressure			
Arterial blood pressure catheter	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Pulmonary artery pressure catheter	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Central venous pressure catheter	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Pulse Oximetry	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Thermo-dilution Cardiac Output	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Temperature			
Esophageal	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Arterial	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Respiratory Mechanics			
Respiratory Rate	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Tidal volume	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Ventilatory pressures and flows	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Respiratory Gas Monitoring			
O2	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
CO2 (capnography)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

Capability #3. Allowed the healthcare provider(s) to perform therapeutic interventions:

Airway Interventions			
Direct Laryngoscopy	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Oral Intubation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Nasal Intubation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Needle cricothyrotomy	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Transtacheal jet ventilation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Retrograde wire techniques	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Tube cricothyrotomy	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Light wand intubation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Fiberoptic intubation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Suction	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
oral airway devices	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
nasal airway devices	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
endotracheal tube devices	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
combitube	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
laryngeal mask airway	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
tracheal airway	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
rescue breathing	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
bag-valve-mask	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
mechanical ventilation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Supplemental oxygen	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Cardiac and Circulation			
Antecubital IV	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Right internal jugular IV	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Femoral veins IV	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Fluid replacement therapy	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
CPR	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Defibrillation	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Transthoracic cardiac pacing	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

- **Pharmacological Therapy**

IV drug bolus	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
IV drug infusion (e.g., syringe pump)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Inhaled anesthetics (at FST and CSH)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

Trauma Procedures

Needle Decompression of a tension pneumothorax	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Chest tube placement and management	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Pericardiocentesis	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

Capability #4. Allowed the health care provider(s) to monitor casualty status:

ECG 5	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Cardiac Output (CO)	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Heart Rate (HR)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Arterial Blood Pressure (ABP)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Pulmonary Artery Pressure (PAP)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Central Venous Pressure (CVP)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Temperature (Blood)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Esophageal Temperature	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
SP02	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A

1.3 Casualty Handler:

Capability # 1. Successfully instantiated casualties at any Casualty Treatment Station:

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Capability #2. Successfully develop, track, and execute scenarios that can be applied to a given casualty:

- **Scenario Editor/Player**

Create new scenario	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Edit scenario	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Save scenario	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Start scenario	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Pause scenario	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Restart scenario	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Save physiology	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input checked="" type="checkbox"/> N/A
Observe physiological state	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Observe physiological state	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Observe virtual geographic location	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Capability #3. Successfully monitor the location and status of casualties across the battlefield:

• Blunt abdominal injury			
Locations	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Status	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Blunt chest injury			
Locations	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Status	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Compound fracture of the left leg			
Locations	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Status	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Gunshot wound to the left chest			
Locations	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Status	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Gunshot wound to the right chest			
Locations	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Status	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
• Closed head injury			
Locations	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Status	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Capability #4. Successfully transfer casualties from one location to another:

Casualty Collection Point to Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Casualty Collection Point to Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance to Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance to Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance to Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance to Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance to Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance to Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance to Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

1.4 After Action Review:

Capability # 1. Accurately recorded the time of the injury:

Blunt Abdominal Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Accurately record the location of the casualty in the battle field:

Blunt Abdominal Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Accurately record the time of treatment performed at each casualty treatment station:

Blunt Abdominal Injury at Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Abdominal Injury in Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Abdominal Injury in Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Abdominal Injury at Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Abdominal Injury at Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Abdominal Injury at Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury at Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury in Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury in Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury at Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury at Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury at Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg at Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg in Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg in Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg At Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg At Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg At Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest at Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest in Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest in Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest at Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest at Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest at Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest at Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest in Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest in Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest at Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest at Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest at Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury at Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury in Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury at Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury at Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury at Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Accurately record the type of treatment performed at each casualty treatment station:

- **Blunt Abdominal Injury**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

- **Blunt Chest Injury**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

- **Compound Fracture of the Left Leg**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

- **Gunshot Wound to the Left Chest**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

- **Gunshot Wound to the Right Chest**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

- **Closed Head Injury**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Accurately develop a traceability report of the evacuation and movement throughout the battlefield:

- **Blunt Abdominal Injury**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
- **Blunt Chest Injury**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
- **Compound Fracture of the Left Leg**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
- **Gunshot Wound to the Left Chest**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
- **Gunshot Wound to the Right Chest**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
- **Closed Head Injury**

Casualty Collection Point	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Ground Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Battalion Aid Station	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Forward Surgical Team	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Air Ambulance	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Combat Support Hospital	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Accurately record each casualty medical outcome:

Blunt Abdominal Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

Objectively record a score for User Actions in a Scenario:

Blunt Abdominal Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Blunt Chest Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Compound Fracture of the Left Leg	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Left Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Gunshot Wound to the Right Chest	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A
Closed Head Injury	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail	<input type="checkbox"/> N/A

DACP - Mini Combat Trauma Patient Simulation System



Mini Combat Trauma Patient Simulation (CTPS) Startup Reference Guide

Prepared by:

Medical Education Technologies, Inc. (METI)
6000 Fruitville Road
Sarasota, FL 34232

Step-by-Step Startup for Mini-CTPS

Equipment Components

1. Virtual Node

Consists of G4 PowerBook (Master Workstation (MW))
17" Monitor, mouse, keyboard
G4 computer → Ethernet cable → hub

2. Node 1 – ECS285

Casualty Collection Point (CCP)
G4 computer → PCU, uplink → hub (PATSIM)
17" PATSIM monitor
iBook = CCP Triage Controller
Sampo (Waveform Display)

3. Node 2 – ECS205

Air Evacuation (AEVAC) or Ground Evacuation (GEVAC)
G4 PowerBook (PATSIM) → PCU, uplink → hub
iBook = AEVAC/GEVAC Triage Controller
Sampo

4. Node 3 – ECS191

Battalion Aid Station (BAS) or Forward Surgical Team (FST) or Combat Support Hospital (CSH)
G4 PowerBook (PATSIM) → PCU, uplink → hub
iBook = BAS, FST, CHS Triage Controller
Sampo

Startup Order

1. Turn on all PCUs.
2. Turn on all computers (8); allow computers to initialize
3. Select "CTPS User" on all books. Enter password: ctps.
4. Verify that all iBooks and the MW are on the correct network.
5. Highlight the AirPort icon on menu bar. Instructor Workstation should connect to ECS285.

Node 1

- Select desired script. Scripts are not "mix and match". They must be the same throughout:
- Desktop/scripts/"desired script"/Tikrit/CCP/ctps.ctps
- CTPS Logo window should appear

Node 2

- On the G4, select the appropriate transport mode for the script from the dock: AEVAC or GEVAC.
- On the iBook, select appropriate Triage Controller from the dock: AEVAC or GEVAC.
- Select script: Desktop/scripts/"desired script"/Tikrit/GEVAC (or AEVAC)/ctps.ctps
- CTPS Logo window should appear.

Node 3

- On the G4, select the receiving facility that matches the script from the dock: BAS or FSH or CHS.
- On the iBook, select the appropriate Triage Controller from the dock.
- Select script: Desktop/scripts/"desired script"/Tikrit/CSH (or BAS, or FST)/ctps.ctps
- CTPS Logo window should appear.

Master Workstation

- Select AARLogger icon from dock (IW).
- Name file and location to save.
- Save to desktop.
- Verify connection to Casualty Handler.
- Select CTPS Player icon from the dock.
- Verify that "Connected to Patient Model Simulator: (IP)" appears in the window.
- Select File/Open from the menu bar.
- In the window, select Desktop/scripts/"desired script"/Tikrit/ctps.ctps.
- The "Play" button should now be highlighted. Press "Play".
- Verify that patients are loading. There should be 6 patients in the script. It takes a few minutes to load all patients....Please be patient!

In Script

1. Patients will show up at Node 1 (CCP).
 - a. Begin triage and treatment of patients at CCP. Remember that patients will keep arriving while you are treating others. **Also keep track of your resources**.
2. Dispatch ambulance immediately from Node 2.
 - a. Select destination and route, and then press OK.
 - b. All ambulance transfers and patient movement is manipulated through Node 2.
 - c. When ambulance arrives at the CCP, load patients. ** Air evacuation can only move 2 patients, ground evacuation can move 4 patients**.

- d. Resupply CCP from the ambulance at this time. Ambulance can resupply at destination treatment facility.
- e. Press "Ambulance can leave" button at Node 1.
- f. When patients arrive at destination facility (Node 3), you must unload patients to destination facility from Node 2.

Note: Patients can be inserted at any time to any destination, via "Start Patient" on the Instructor Workstation.

After Action Review (AAR)

To review a particular script that has been logged by the AAR Logging System, perform the following:

1. Quit TCs and PatSIMS (see Shutting Down System).
2. Quit AARLogger.
3. Quit CTPS Player.
4. Select the AAR icon from the dock. Enter the same script file path used for the exercise in the "Script" window.
5. Enter the path of the log file for the exercise (usually saved to Desktop) in the "Log" window.
6. View Map Panel, Station View, or Patient View. You can also click on the "Scores" button to see appropriate/inappropriate treatment given and subsequent scores.

Shutting Down System

When you are finished with the CTPS script and mannequins, shut down the system in the following order.

- For the 3 Triage Controllers (iBooks):
 1. Select "Triage Controller" at the top menu bar.
 2. Highlight "Quit Triage Controller" in the drop down menu.
 3. Press "Enter".
- For the 3 PATSIM Terminals (G4 PowerBooks):
 1. Select "Terminal" at the top menu bar.
 2. Highlight "Quit Terminal" in the drop down menu.
 3. "Terminate" should be highlighted.
 4. Press "Enter".
- For the Virtual Node Terminal (G4 computer):
 1. Select "Terminal" at the top menu bar.
 2. Highlight "Quit Terminal" in the drop down menu.
 3. Highlight "Terminate Processes" in the selection box.
 4. Press "Enter".

- For the Master Workstation (G4 computer):
 - 1. If running the AARLogger;
 - a. Select “AARLogger” at the top menu bar.
 - b. Highlight “Quit AARLogger” in the drop down menu.
 - c. Press “Enter”, application will quit.
 - 2. To quit CTPS Player:
 - a. Select “CTPSPlayer” at the top menu bar.
 - b. Highlight “Quit CTPSPlayer” in drop down menu.
 - c. Press “Enter”, application will quit.

Note: Be sure to turn off PCUs and TDCKs (if used). Make sure all monitors are turned off.

**Mini Combat Trauma Patient Simulation System
Defense Acquisition Challenge Program
(DACP)**



**Mini Combat Trauma Patient Simulation (CTPS)
Training Outline**

Prepared by:

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Mini Combat Trauma Patient Simulation (CTPS)

Training Outline

Background

- CTPS installs
 - Fort Gordon (less)
 - Fort Sam Houston (more)

Level of Care (node) descriptions

- CCP
- A(IR)EVAC, GEVAC
- BAS
- FST
- CSH
- Master Workstation
- Virtual Node/Casualty Handler Engine/Scenario Processor

Applications

- Casualty Handler Engine v6.3 CTPS
- Casualty Handler User Interface v6.3 CTPS
- Waveform Display 2.1.1 (and how to mask it: hide, power, mute, quit)
- PatSIMs
- Triage Controllers
- Script Player
- Script Editor
- AARLogger
- AAR

Logistics

- Resources at each node
- Determining level-of-care combination desired
- Ambulance transfer times
- How to transfer patients between nodes

Demo

- Demo may be performed earlier, depends on setup/audience preferences

Technical

- How to hook it all together
- 24 port switch
- Ethernet cables
- ECSeS
- iBooks
- Powerbooks
- PowerMacs
- TDCKs
- Displays (15" Sampos and 17" Apple LCD)

Hands-on Session

Questions & Answers (Q&A) on Simulators or CTPS System

**Mini Combat Trauma Patient Simulation System
Defense Acquisition Challenge Program
(DACP)**

**Mini Combat Trauma Patient
Simulation (CTPS)**

User Guide

Prepared by:

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Part I. Introduction

1.1 Overview and Background.

This user guide has been developed specifically for the Mini Combat Trauma Patient Simulation system (Mini CTPS). It addresses the use of the software applications that comprise Mini CTPS. Please refer to your Emergency Care Simulator (ECSTM) User Guide for use, safety, and maintenance of the ECS mannequin.

The Mini CTPS utilizes the low cost, physiologically modeled ECSTM instead of the hospital-level simulator: Human Patient Simulator (HPSTM). This system provides a military medical simulation system for training, testing and evaluation. Using the ECS in a 'Mini CTPS' configuration enhances the system's portability, affordability and ease of deployment for active forces. The Mini CTPS consists of three Emergency Care Simulators, three Trauma Disaster Casualty Kits (TDCKTM), and a computer control system for Triage and Casualty Handling. The TDCK is a portable unit that allows for a variety of secretions and hemorrhaging that is influenced by the physiological models of the patient. It includes a moulage kit for simulating fractures, lacerations, amputations, blisters and burns.

The Mini CTPS System possesses the following characteristics:

Realistic Simulation of Casualties/Patients

The Mini CTPS System provides a simulation suite whose components can be tailored to replicate any military medical environment for initial, entry-level or refresher training in a fixed simulation lab, or sustainment training in a field setting or forward deployment. In its traceability of a combat casualty, the System will electronically monitor a patient from incidence of wound to final outcome at each level in real time. The System is able to replicate combat trauma, chemical and biological injury, and can also be expanded for other casualties. The goal of this system is to increase readiness by having better prepared military medical personnel, ultimately decreasing fatalities due to combat conditions.

Objectivity

The Mini CTPS System provides medical instructors and trainees a tool in which they can evaluate performances via the resources of valid, accurate medical simulations. This also results in the elimination of subjective influences on the training outcomes.

Portability/Deployability

The portability of the Mini CTPS provides the ability to:

- Enhance initial, refresher, and sustainment training for all medical personnel
- Support individual and team training during remote deployments or field deployment
- Support, replicate and assess battlefield injuries by type and category
- Compare intervention and outcomes at each military healthcare service delivery level

I.2 Mini CTPS Configuration

The Mini CTPS system is comprised of three nodes, two of which can simulate different nodes of military care (Figure 1).

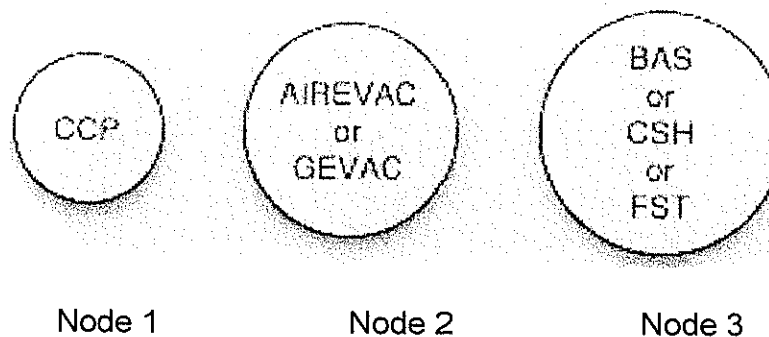


Figure 1. Node configuration for the Mini CTPS system.

In this figure, each acronym is defined as the following:

CCP.....Casualty Collection Point
AIREVAC.....Aeromedical Evacuation Vehicle
GEVAC.....Ground Medical Evacuation Vehicle
BAS.....Battalion Aid Station
CSH.....Combat Support Hospital
FST.....Forward Surgical Team

With this node configuration, the possible level-of-care combinations are:

1. CCP-AIREVAC-BAS
2. CCP-AIREVAC-CSH
3. CCP-AIREVAC-FST
4. CCP-GEVAC-BAS
5. CCP-GEVAC-CSH
6. CCP-GEVAC-FST

The table below shows the current configured evacuation times between the CCP and All other nodes relative to the vehicle.

NODES		AIREVAC (hh:mm:ss)	GEVAC (hh:mm:ss)
FROM:	TO:		
CCP	BAS	00:10:17	00:20:00
CCP	CSH	00:35:00	3:30:00
CCP	FST	00:20:00	1:20:00

Table 1: Time between CCP and other nodes relative to evacuation vehicle

Equipment Setup at Each Node

Each node in the Mini CTPS configuration is comprised of a Triage Controller (the user interface) and a PatSIM (runs the patient models). This relationship is detailed in Figure 2.

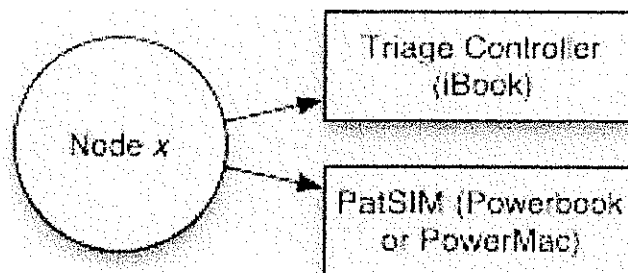


Figure 2. Breakdown of the computers in each node.

- A detailed list of equipment at each node and the setup structure is listed in Figure 3.

Virtual Node	NODE 1 (CCP)	NODE 2 (AIREVAC) or (GEVAC)	NODE 3 (BAS) or (FST) or (CSH)
	ECS#1, TDCK	ECS#2, TDCK	ECS#3, TDCK
G4 PowerMac with 17" Monitor (Master Workstation)	PowerMac G4 with 17" PATSIM Monitor	PowerBook G4	PowerBook G4
Mouse	CCP Triage Controller (iBook)	AIREVAC/GEVAC Triage Controller (iBook)	BAS, FST, CHS Triage Controller (iBook)
Keyboard	Waveform Display (Sampo Monitor)	Waveform Display (Sampo Monitor)	Waveform Display (Sampo Monitor)
SETUP STRUCTURE			
G4-Ethernet Cable-hub	G4-PCU, Uplink-> hub	G4 (PATSIM) ->PCU, uplink-hub	G4 (PATSIM) -> PCU, uplink -> hub

Figure 3. Equipment List at each Node.

I.3 Quick Start for Mini-CTPS

Getting Started

To start a Mini CTPS exercise, the following must be done:

1. Turn on all PCUs. (Refer to ECS User Guide)
2. Turn on all computers (8); allow computers to initialize
3. Select "CTPS User" on all books. Enter password: ctps.
4. If a log of the exercise is to be collected for review via the CTPS After Action Review, start the AAR Logger by clicking on its icon on the Master Workstation.
5. After the AAR Logger is started, start the Triage Controllers for all nodes by clicking on the Triage Controller icon on the iBooks.
6. Verify that all iBooks and the Master Workstation are on the correct network.
7. Highlight the AirPort icon on menu bar. Master Workstation should connect to the Node 1 ECS.
8. When the Triage Controller starts up, there will be a small dialog box or window asking the user to select a script for the exercise. Use the 'Browse' button to select the desired script

Step-by-Step Procedure

Master Workstation

- Select AAR Logger icon from dock on Master Workstation.
- Name the file and save to desktop.

Node 1

- Select desired script. Scripts are not "mix and match". They must be the same throughout:
- Desktop/scripts/"desired script"/Tikrit/CCP/ctps.ctps
- CTPS Logo window should appear

Node 2

- On the G4, select the appropriate transport mode for the script from the dock: AEVAC or GEVAC.
- On the iBook, select appropriate Triage Controller from the dock: AEVAC or GEVAC.
- Select script: Desktop/scripts/"desired script"/Tikrit/GEVAC (or AEVAC)/ctps.ctps
- CTPS Logo window should appear.

Node3

- On the G4, select the receiving facility that matches the script from the dock: BAS or FSH or CHS.
- On the iBook, select the appropriate Triage Controller from the dock.
- Select script: Desktop/scripts/"desired script"/Tikrit/CSH (or BAS, or FST)/ctps.ctps
- CTPS Logo window should appear.

Master Workstation

- Verify connection to Casualty Handler.
- Select CTPS Player icon from the dock.
- Verify that "Connected to Patient Model Simulator: (IP)" appears in the window.
- Select 'File/Open' from the menu bar.
- In the window, select Desktop/scripts/"desired script"/Tikrit/ctps.ctps.
- The 'Play' button should now be highlighted. Press 'Play'.
- Verify that patients are loading. There should be 6 patients in the script. It takes a few minutes to load all patients.... Please be patient!

In Script

1. Patients will show up at Node 1(CCP).
 - a. Begin triage and treatment of patients at CCP. Remember that patients will keep arriving while you are treating others. Keep track of your resources while treating patients.

2. Dispatch ambulance immediately from Node 2.
 - a. Select destination and route, and then press OK.
 - b. All ambulance transfers and patient movement is manipulated through Node 2.
 - c. When ambulance arrives at the CCP, load patients. AEVAC can only move 2 patients, GEVAC can move 4 patients.
 - d. Restock CCP resources from the ambulance at this time. The ambulance can restock at destination treatment facility.
 - e. Press "Ambulance can leave" button at Node 1.
 - f. When patients arrive at destination facility (Node 3), you must unload patients to destination facility from Node 2.

Note: Patients can be inserted at any time to any destination, via "Start Patient" on the Instructor Workstation.

After Action Review (AAR)

To review a particular script that has been logged by the AAR Logging System, perform the following: (Refer to AAR section for detailed instructions)

1. Quit Triage Controllers and PATSIMS (see Shutting Down System).
2. Quit AAR Logger.
3. Quit CTPS Player.
4. Select the AAR icon from the dock. Enter the same script file path used for the exercise in the "Script" window.
5. Enter the path of the log file for the exercise (usually saved to Desktop) in the "Log" window.
6. View Map Panel, Station View, or Patient View. You can also click on the "Scores" button to see appropriate/inappropriate treatment given and subsequent scores.

Shutting Down System

When you are finished with the CTPS exercise and mannequins, shut down the system in the following order.

1. For the 3 Triage Controllers (iBooks):
 - a. Select "Triage Controller" at the top menu bar.
 - b. Highlight "Quit Triage Controller" in the drop down menu.
 - c. Press "Enter".
2. For the 3 PatSIM Terminals (G4 PowerBooks):
 - a. Select "Terminal" at the top menu bar.
 - b. Highlight "Quit Terminal" in the drop down menu.
 - c. "Terminate" should be highlighted.
 - d. Press "Enter".

3. For the Virtual Node Terminal (G4 computer):
 - a. Select "Terminal" at the top menu bar.
 - b. Highlight "Quit Terminal" in the drop down menu.
 - c. Highlight "Terminate Processes" in the selection box.
 - d. Press "Enter".
4. For the Master Workstation (G4 computer):
 - a. Select "AAR Logger" at the top menu bar.
 - b. Highlight "Quit AAR Logger" in the drop down menu.
 - c. Press "Enter", application will quit.
2. To quit CTPS Player:
 - a. Select "CTPS Player" at the top menu bar.
 - b. Highlight "Quit CTPS Player" in drop down menu.
 - c. Press "Enter", application will quit.

Note: Be sure to turn off PCUs and TDCKs (if used). Make sure all monitors are turned off.

Part II Triage Controller Application

II.1 Overview

The Triage Controller simulates a casualty treatment station by providing a view of its patients and resources available for treatment. This station can be at the Casualty Collection Point, Battalion Aid Station, the Aeromedical Evacuation Vehicle, the Ground Medical Evacuation Vehicle, Forward Surgical Team, or Combat Support Hospital.

The patients at the simulated location can be examined and treated from the Triage Controller. Alternatively, from the Triage Controller the user can select a patient to be simulated on an ECS. This full sized automated mannequin can be examined and treated much like a real patient using tools identical, or similar, to the tools and instruments that would be used on a real patient.

The Triage Controller provides additional support to simulations and training in the form of treatments to be applied to a simulated patient that cannot be performed at present on the ECS. As an example, consider the patient with a bilateral amputation below the knee where the student selects to control the bleeding with a tourniquet. When the action is selected in the Triage Controller, the Controller informs the Patient Simulation software so that the physiology of the patient changes and the bleeding stops. This cannot be accomplished on the ECS since it does not have the hardware to detect that a tourniquet has been applied to the injury. An instructor or subject matter expert can define additional treatments using the CTPS Script Editor to modify and existing, or create an entirely new, training exercise. (See Part IV CTPS Script Editor). This may require editing or creating patient physiological simulation models, or “scenarios”.

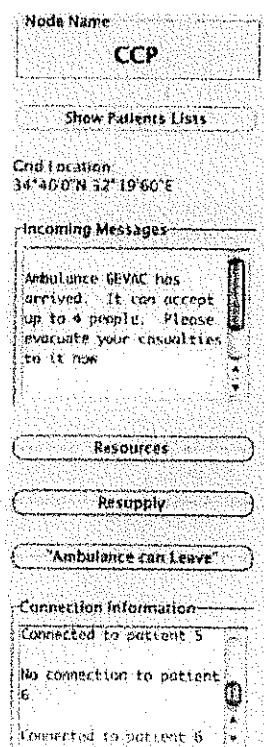


Figure 4. Station Status Panel

In addition to supporting training in treatment decisions, the Triage Controller also supports training in decision making and prioritizing the management of station resources and patient evacuation.

II.2 Components

The Triage Controller user interface is made up of three main components: the Station Status Panel, the Patient View and Selection Panel, and the Examination and Treatment Panel.

The Station Status Panel is a vertical panel on the left of the screen and provides information about the station and events during the exercise (Figure 4).

The Patient View and Selection Panel provides lists of the patients according to their position in the treatment process (e.g., new, in treatment, etc..) and which, if any, patient is instantiated on the ECS (Figure 5). Controls to move the patients through the treatment process and to triage and evacuate patients are provided here as well.

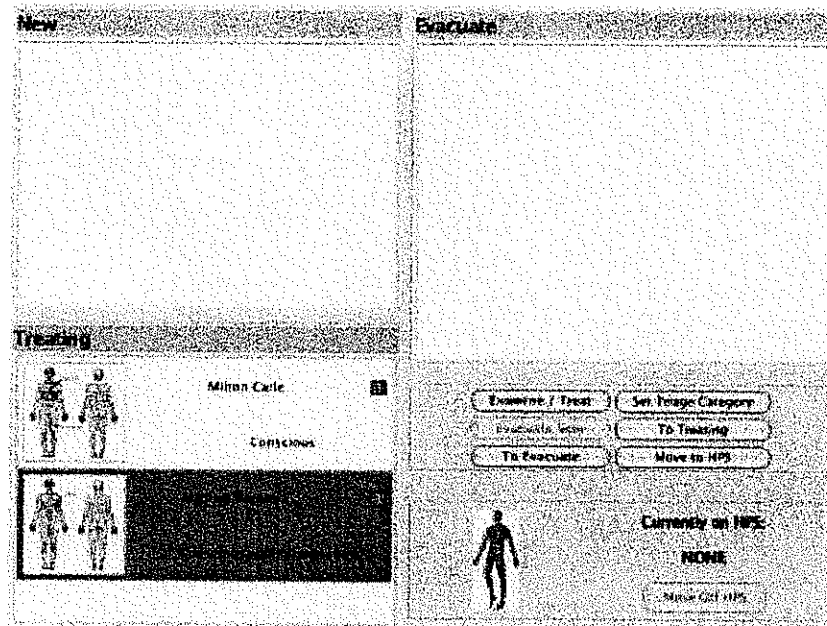


Figure 5. Patient Selection Panel

The **Examination and Treatment Panel** provides a detailed view of a single patient and allows more detailed examination, including lab tests, or treatment of the patient (Figure 6).

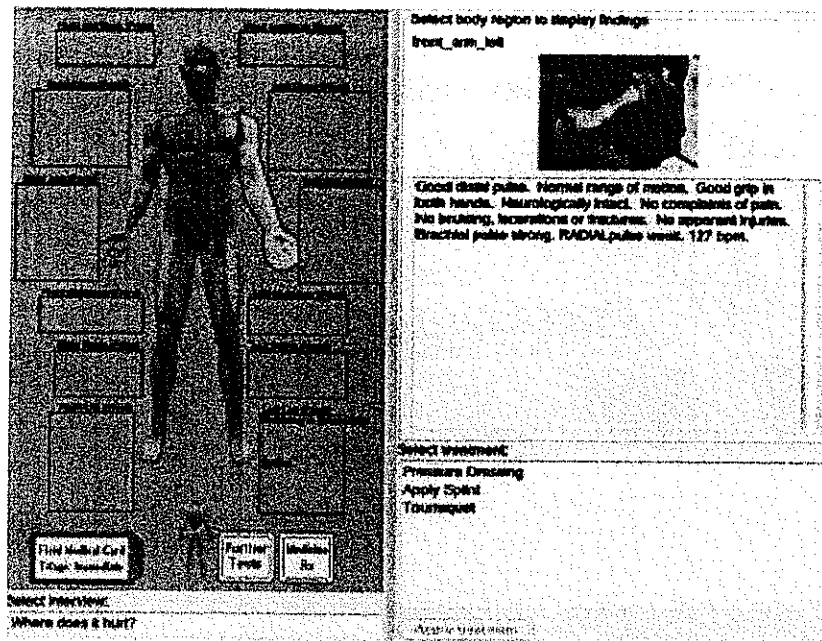


Figure 6. Examination and Treatment Panel

II.3 Station Status Panel

After starting the Triage Controller, the leftmost part of the screen contains the Station Status Panel (Figure 7). This panel serves as the station control panel for the application. The Status Panel appears to the left of the Patient View and Selection Panel and the Examination and Treatment Panel when they are visible.

Node Name CCP	Station Name
Show Patients Lists	Show Patients Lists Button Displays the list(s) of patients.
Grid Location: 34°40'0"N 32°19'60"E	Location (on mobile nodes only) The name of the node being visited
Incoming Messages	Grid Location Current geographical coordinates of the simulated unit.
Ambulance GEVAC has arrived. It can accept up to 4 people. Please evacuate your casualties to it now	Message Box An example of a message that might display in this box is "Ambulance AIR has arrived" indicating that the user should evacuate his patients to the ambulance.
Resources	Resources Button This button brings up a dialog that displays the current level of selected resources and the time of the next scheduled re-supply. (e.g., Number of saline IV bags.) (See Figure 3.)
Resupply	Resupply Button Used to request supplies from another simulated unit
"Ambulance can Leave"	Ambulance Can Leave Button / Depart Button For a stationary unit, informs an ambulance that you are done transferring patients (See Evacuation section.) For mobile units, allows Triage Controller to move to another location.
Connection Information	Connection Status Box This box displays messages concerning the status of the network connections and simulation.
Connected to patient 5	
No connection to patient 6	
Connected to patient 6	

Figure 7. Station Status Panel Detail

The Station Status Panel contains a box displaying the name of the unit being simulated by the Triage Controller, the "Show Patient Lists" button, the Location Display, the "Incoming Message" box, the "Resource" button, the "Resupply" button, the "Depart" button, if the unit is mobile or, optionally, the "Ambulance Can Leave" button if it is not, and the "Connection Status" display.

An ambulance is responsible for its own travel. Clicking on "Depart" brings up a dialog box listing the nodes it can travel to. Selecting a node and clicking "OK" starts a timer dialog which will shut down when the ambulance arrives at the chosen station. To arrive at the station immediately, click "Arrive Now". Clicking "Stop" stops the ambulance at the geographic location it was in when the button was pressed. Its location is "in transit" until the "Leave Now" button is clicked and another destination chosen.

When two units are together (e.g. a mobile unit is visiting a stationary unit), either may request supplies from the other. If the requested supplies are present, the transfer is automatic and does not require any action on the part of the operator of the Triage Controller the supplies are being requested from. The levels of supplies at both nodes are adjusted accordingly.

II.4 Patient Lists Panel

To pull up the Patient Lists Panel (PLP) (Figure 7) by clicking on the Show Patient Lists button at the top of the Station Status Panel.

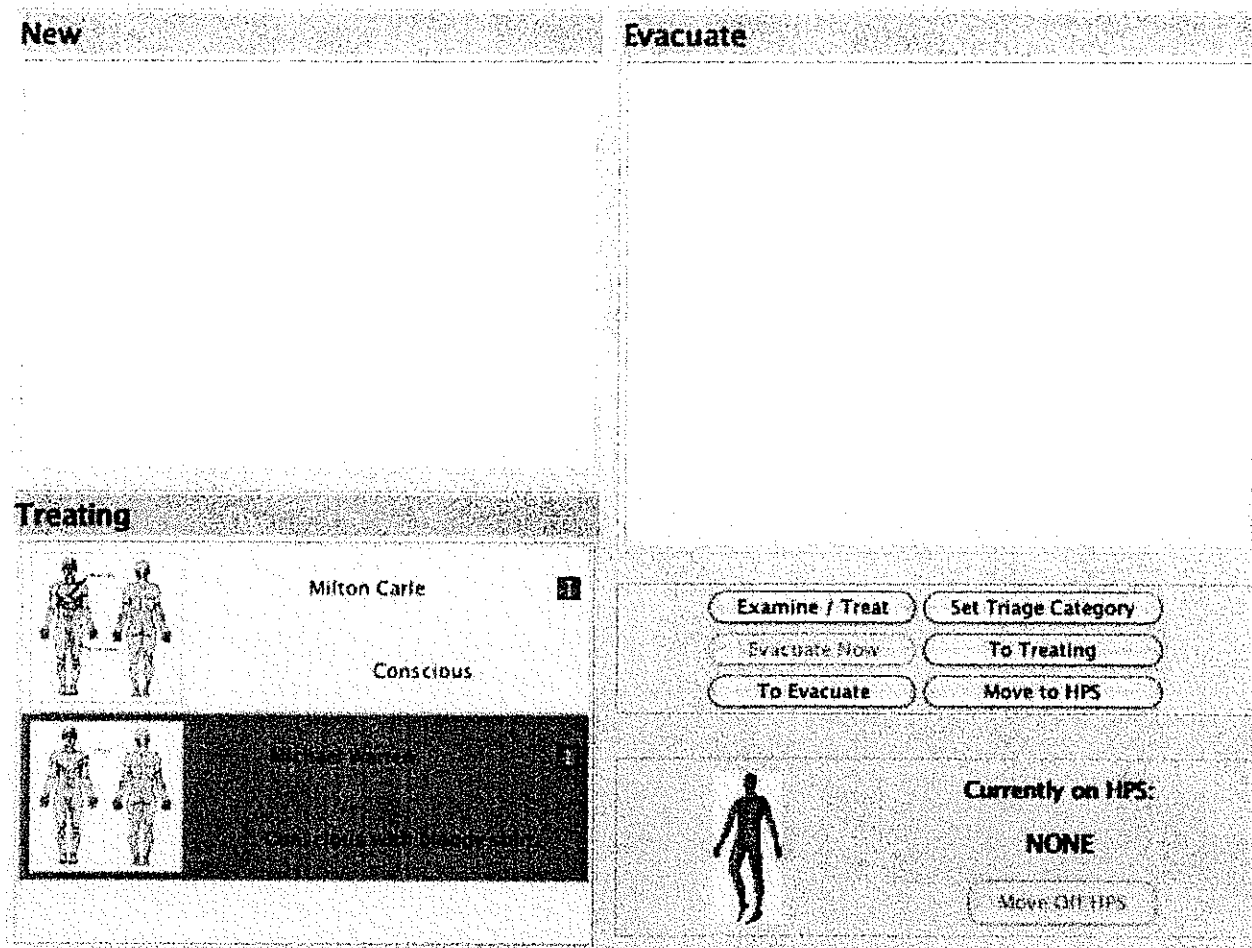


Figure 8. Patient View and Selection Panel

II.4.a Patient List Boxes

The Patient Lists Panel contains up to four lists of patients, a panel indicating the status of the associated Patient Simulator, and a panel of buttons. The collection of lists of patients represents a grouping of patients appropriate to the unit being simulated. For instance, a mobile unit or a CCP would probably not physically separate their patients according to which were the newest to arrive or which were ready to leave. However, a Battalion Aid Station might. The names and number of groups is under the control of the creator of the exercise (see *CTPS Exercise Script Editor* section).

Each list contains a representation of the patients in that group. The patients are represented by a name randomly assigned at the start of the exercise (see *CTPS Script Player* section), a thumbnail icon of the patient, a short description, and an icon indicating that patient's triage category. Clicking on any of the patients on any of the lists selects that patient for action by one of the buttons on the panel. Double clicking will bring up the Examination and Treatment Panel on that patient.

The triage category icons indicate the patient's triage status using a letter and color coding scheme as follows:

1. Minimal - green
2. Immediate - red
3. Delayed - yellow
4. Expectant - black
5. Unknown - white

II.4.b Patient Action Button Panel

On the Patient Lists Panel is the Patient Action Button Panel (PABP). It is a collection of buttons allowing the user to take an action on the selected patient. The location and exact contents of the Patient Action Button Panel is determined by the number and names of the patient lists. Four buttons are always included in the Patient Action Button Panel:

- *Examine / Treat* - Pressing the "Examine/Treat" button will bring up the Examination and Treatment Panel described for the selected Patient. The patient's category will be automatically promoted from the first category to the second, if present.
- *Set Triage Category Button* - The user can assign a triage category by clicking on the "Set Triage Category" button. This will bring up the Triage Category dialog box. Click on the appropriate option on the new screen: Immediate, Delayed, Minimal, or Expectant. To save the change and close this dialog box click "OK".
- *Evacuate Now Button* - If another unit is present, clicking on this button brings up a panel asking you to select or confirm the ambulance or stationary unit to load the selected patient onto, then sends the selected patient to that unit. For a mobile unit, this button is labeled "Unload Now".
- *Move to HPS Button* - A simulated patient can be instantiated on an Emergency Care Simulator (ECS) allowing the student to practice procedures on it. To do so, highlight the patient one of the patient lists and click on "Move to HPS." The ECS will begin simulating that patient (this may take a minute or two). The HPS Panel will display the name of the patient on the HPS. At the bottom of that panel is a button allowing the user to empty the HPS, making it available for another patient. The patient's category will be automatically promoted from the first category to the second, if present.¹

In addition, buttons will be present to move patients between the different lists of patients.

¹ CTPS assumes that if more than one category is in use at a station, the first category represents patients that have not yet been examined. Thus, when a patient is examined, his category is updated to reflect that.

II.5 HPS Panel

The HPS Panel shows the name of the patient, if any, currently being simulated on mannequin associated with that simulated unit and Triage Controller. A button underneath the name allows the user to move the patient off the mannequin or abort a transfer not yet completed.

II.6 Evacuation Procedure

When an ambulance arrives at a station, a message to that effect will be displayed in the message boxes on the Station Status Panels of the ambulance and the destination station. To transfer patients to the ambulance from the other node, the user selects a patient in any of the category lists and clicks "Evacuate Now" ("Unload Now" on a mobile unit). A small dialog box window will appear allowing the user to either confirm or select the other unit to transfer the patient to. This will move the patients to the other node.

A stationary unit may send a message to the ambulance that is done evacuating patients to it and that it can leave by clicking on the "Ambulance Can Leave" button. This will cause a message to appear on the selected ambulance's Incoming Message Box indicating that he is cleared to leave.

II.7 Examination and Treatment Panel

The Examination and Treatment Panel (Figure 9) graphically and textually displays the status of the selected patient currently being examined and treated. It includes the Patient View, the Feedback Panel, the Interview Panel, and the Treatment/Test Panel.

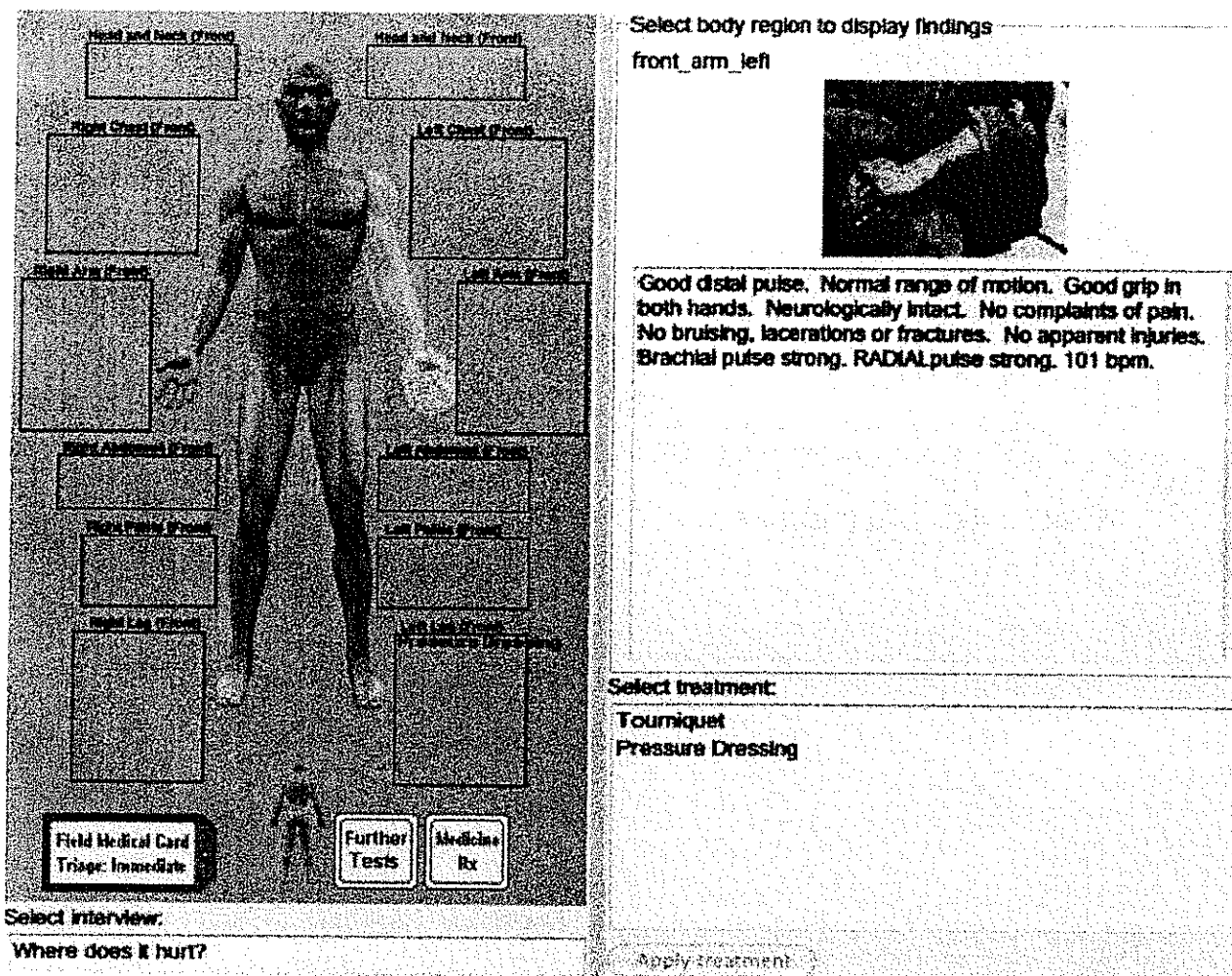


Figure 9. Examination and Treatment Panel

II.8 Patient Panel

The Patient Panel displays a homunculus overlaid with icons that represent the visible indications of the treatments that have been applied to the patient. Below the homunculus are three icons: The Field Medic Card, the Further Tests box, and the Medicine box.

The homunculus is divided into regions. Clicking on a region brings up in the Feedback Panel the corresponding image and textual description for that patient in that condition. It also brings up the treatments that may be applied to that region in the Treatment/Test panel. The content of the list is under the control of the writer of the exercise or script being used (see *CTPS Exercise Script Editor*).

At the bottom and center of the Patient View is an icon showing a homunculus turned the opposite direction of the large homunculus in the panel. Clicking on this icon flips the homunculus, allowing the user to examine the opposite side.

Clicking on the Field Medic Card brings up a dialog showing a list of the treatments and notes applied to this patient along with a field allowing the user to add a note, and a set of radio buttons allowing the user to select the patient's triage category. The color of the border of the Field Medic Card icon will change according to the triage category selected.

Clicking on the Further Tests box will bring up a list of additional tests or examination actions that may be applied to this patient. The contents of the list are determined by the script writer. The results of the test or examination, whether text or graphic, will be shown in the Feedback Panel.

Clicking on the Medicine box will bring up the list of medications that can be applied by the unit. Again, this is under the control of the writer of the script being used.

II.8.a Feedback Panel

The Feedback Panel, located in the upper right-hand part of the panel, displays the condition of the patient through images and text. These images or text are determined by the selection of a region on the homunculus, the selection of an interview question, or of a test.

Above a text box an image is displayed corresponding to the region or test or interview question selected. The text box shrinks or expands depending on the size of the image being shown.

Pulse and respiration rates are reported with their associated body regions. For instance, clicking on the arm or leg will report the pulse in those extremities, if present. Clicking on the chest will report the respiration rate.

II.8.b Treatment / Test and Interview Panels

Directly under the Feedback Panel is a list of treatments or tests corresponding to the region of the homunculus or the Further Tests or Medicine box selected. The user may select one of the treatments or test and click on "Apply treatment", or he may double click his selection. This will bring up a dialog or window to confirm the application of the treatment or test and allow the user to select any options for the treatment or test such as dosage.

Before a treatment is applied to a patient, the Triage Controller will first check that the unit has sufficient supplies (for example, IV bags) to apply the treatment. If it does, it will deduct the amount required and apply the treatment. Otherwise, it will display a message to the user that it does not have the required amount of supplies.

If a treatment was selected, depending on the treatment (determined by the script being used), an icon representing the treatment may appear on the Patient Panel. If a test or interview was selected, the results will be displayed in the Feedback Panel. In all cases, the action will be recorded in the patient's Field Medic Card.

Clicking on a question in the Interview Panel brings up the patient's response, displayed graphically and/or textually in the Feedback Panel.

II.8.c Example

Example:

1. After starting the Triage Controller click on the Show Patient Lists button located on the Status Panel.
2. The Show Patient Lists Panel comes up on the screen.
3. Select a patient by highlighting his name, then click on the "Examine/Treat" button or double click to examine the patient more closely in the Examination Treatment Panel.
4. The Examination and Treatment Panel appears.
5. Click on the Field Medical Card icon underneath the homunculus representing the patient.
6. The patient's Field Medical Card view comes on the screen, giving the operator the choice of entering treatment notes or selecting the patient's triage category.
7. Clicking on the regions of the homunculus brings up a description and image representing the patient or region of the body being examined.
8. Clicking on the extremities brings up a description that includes a description of the pulse of the patient at that extremity. Clicking on the chest reports the respiration rate. Other vital signs may be brought up by clicking on the "Further Tests" icon underneath the homunculus.
9. To take the patient's history, click on a question in the Interview Panel. The reply will appear in the Feedback Panel.

II.9 Closing the Triage Controller

When a training or simulation session is over, close the Triage Controller by clicking on the "Close Window" button in one of the upper corners of the Triage Controller window.

Part III. CTPS Player

III.1. Overview

The CTPS Player window comprises a message window; two buttons labeled "Play" and "Start Patient", and a menu bar (see Figure 10). The message window provides the user reports of progress while the patients are starting.

The menu bar carries two menus labeled "Open" and "Settings". Selecting Open brings down the Open menu containing the Open Script item. Selecting it brings up the open script file dialog. Within the dialog the user can select the script associated with the desired exercise.

The "Play" button starts patients automatically based on the script opened above. Patients within a script are associated with a time to be instantiated and a place. The Player instantiates the patients on schedule and instructs the Casualty Handler Engine to move them to the associated node.

The Start Patient button brings up the Start Patient dialog. Within this dialog a user may select a patient contained in the script and the place for the patient to start. The patient will be started immediately after the dialog is closed by pressing the 'OK' button within the dialog.

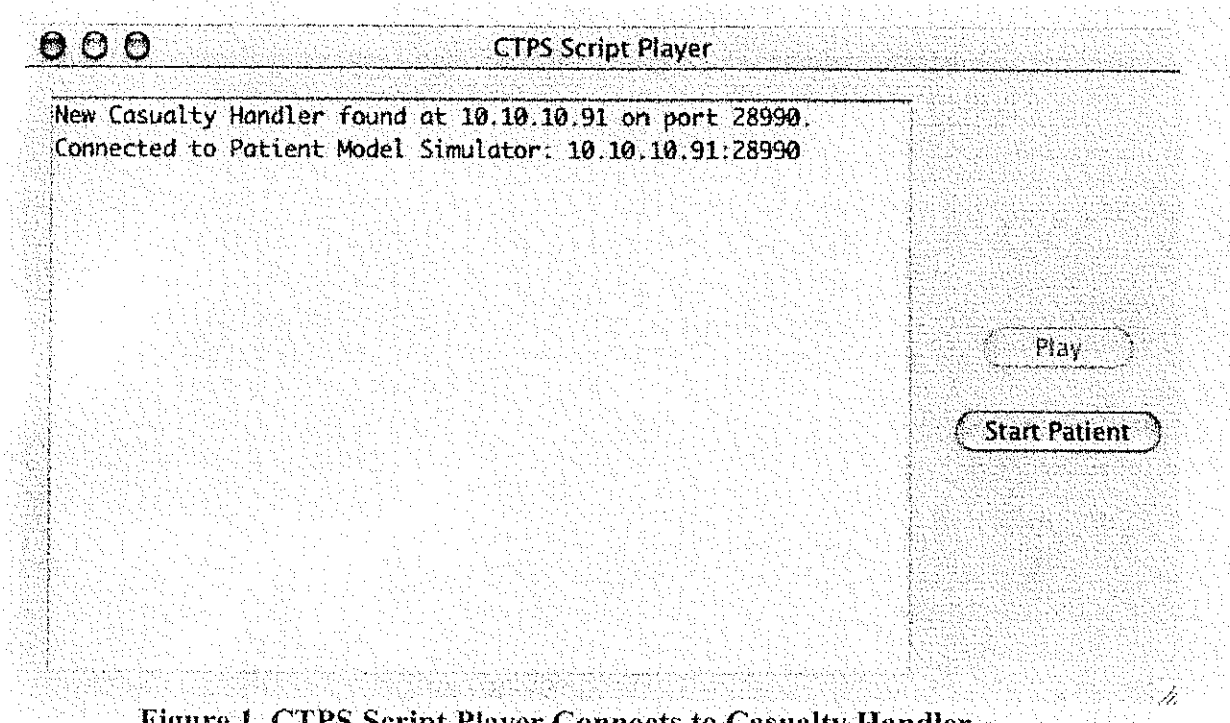


Figure 1 CTPS Script Player Connects to Casualty Handler

Figure 10. CTPS Script Player Connects to Casualty Handler

III.2 Starting the CTPS Player

Clicking on the Player's icon brings up the CTPS Player application (see Figure 11). The Player immediately begins listening on the network for a Casualty Handler and connects to it. Upon connecting to the Casualty Handler, a message to that effect will be displayed in the message window (see Figure 11).

III.3 Setting Up an Exercise

To set up an exercise for playing, the instructor user must first select an exercise script. Use the File/Open drop down menu to select the script. (The script must be one installed by the CTPS Install application from a CTPS Exercise Package.)

Once a script has been selected, the instructor use has two options:

1. He can play the script so that all patients arrive at the times and locations specified in the script, or
2. He can start patients individually and place them at the location of his choosing.

III.4 Playing a Script

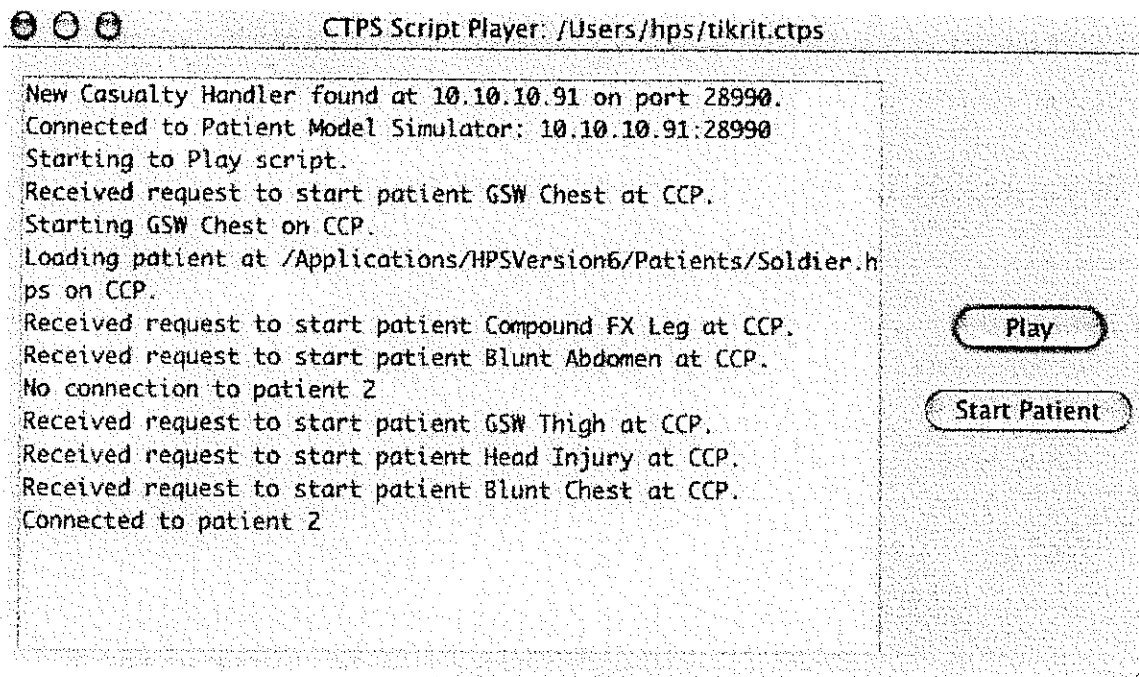


Figure 11. CTPS Player Starting Patients Automatically from Script

When patients are created in the CTPS Script Editor, the script writer specifies the location and time for their instantiation. When the instructor user clicks “Play”, the Player starts a timer for each patient and begins each patient in the script at their specified times (See figure 11).

To begin a patient, the Player sends a message to the Casualty Handler specifying the files required to fully describe the patient to the system. When the patient has been started and its medical scenario file overlaid on it, the Player moves the patient to the location specified in the script. The Player reports each stage in the process to the instructor users so that he can monitor the progress of the Player and intervene if a problem develops.

It takes an appreciable amount of time to start each patient – on the order of a minute or so. If multiple patients are specified as starting at the same time or close together in time, the Player queues them and starts each additional patient after the previous one has been moved to its location.

III.5 Starting Individual Patients

The instructor user may desire to add patients to an exercise, or he may wish to start patients at different times or places than what is specified in the script. In this case, he clicks the "Start Patient" button to bring up the Start Patient Dialog (Figure 12).

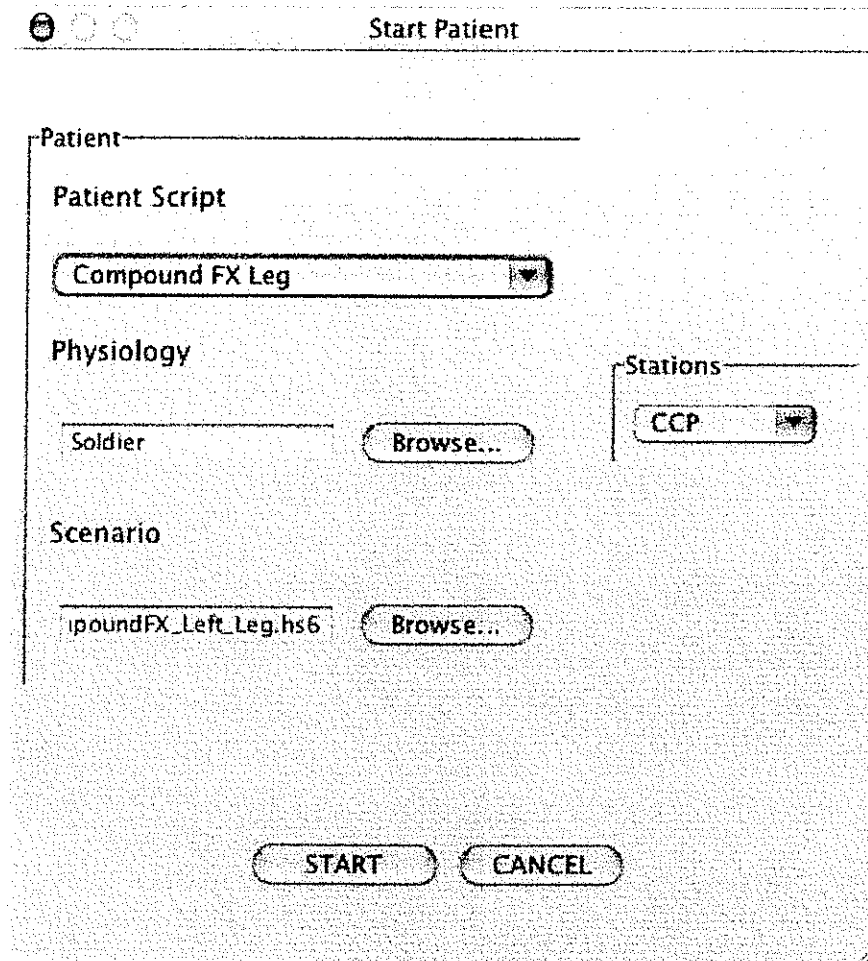


Figure 12. Patient Start Dialog

The instructor user selects a patient script in the dialog. The instructor will see the physiology name and scenario files appear. Then the instructor selects the station where he or she wants the patient to start and clicks "Start" to close the dialog and start the patient.

III.6 Closing the Application

To close the CTPS Script Player Application, click on the close symbol on the window title bar (a red circle with an "x" in it on the left hand side if running Mac OS, and a square with an "x" in it on the right side if running MS Windows).

Part IV. After Action Review

IV.1 Overview

The After Action Review utility records medical team actions, patient physiological data, and station event information during a simulation and brings it up for review after the training simulation is over. Based on the medical team's performance treating the patients and an expert's evaluation criteria, scores are produced for

- 1) Treatment of each patient by all the groups participating in the exercise.
- 2) Prioritization of patients by each group participating in the exercise, and
- 3) Use of resources by each of the groups participating in the exercise.

In addition, the AAR provides a display of the physiological data and of all treatment actions that occurred on patients during the exercise.

The AAR package comprises the AAR Logger (Logger) and the AAR Viewer (Viewer). The Logger records the changes in patient and station status in a specially formatted data file. After the simulation or training session is complete and the Logger closed, the Viewer may be used to read the data file and display the status of any patient or station at any given time.

IV.2 AAR Logger

The Logger runs during a simulation to record patient and station data that may be viewed using the Viewer. In order for the After Action Review Application to work with a training session, the instructor must start the AAR Logger. In order to be certain that it detects all the participants in the session, it should be started before starting the Triage Controllers. When the logger first begins, the application will bring up a dialog allowing the user to select the name to be used for the log file.

The logger connects to the Casualty Handler to read state information about the patients and participating stations. Steps involved in starting the training scenario are as follows:

1. Start the Casualty Handler. (See separate documentation.)
2. Start the Patient Simulation Software for all participating nodes. (See separate documentation.)
3. Start the After Action Review Logger by clicking on its icon.
4. After the After Action Review Logger is started, start the Triage Controllers for all Participating nodes.
5. Start the CTPS Player and select the CTPS script to be used for the exercise. Within the Player, the instructor selects the "Play" button to start all patients automatically based on their scripted times and places of instantiation or "Start Patient" to select patients and the stations they should appear in. The Player sends commands to the Casualty Handler to start the patients and place them at the appropriate CTPS station.
6. After the exercise or training session is finished and the instructor wants to assess the students' performance, the instructor closes the Logger application by clicking the Close Window icon in the corner of the application window. This will save the information and close the Logger.
7. To view the log file, click on the AAR icon and select the file name the log file was saved to. The Map Panel appears as the first After Action Review screen.

IV.3 AAR Viewer

The Viewer provides the instructor with detailed chronological information about a simulated session including patient status, station events, and user actions associated with the patient care and evacuation. To start the viewer, click on its icon. When the Select Script and Log dialog appears, select the script corresponding to the exercise (the same script file used by the CTPS Player to start the exercise) and the log file within the opening window and click "OK".

There are three panels in the viewer, displayed one at a time:

- 1) Map Panel, displaying the stations that participated,
- 2) Station View, and
- 3) Patient View

In addition, clicking on the "Scores" button at the top of the application window will bring up a dialog window displaying the scores calculated from the exercise.

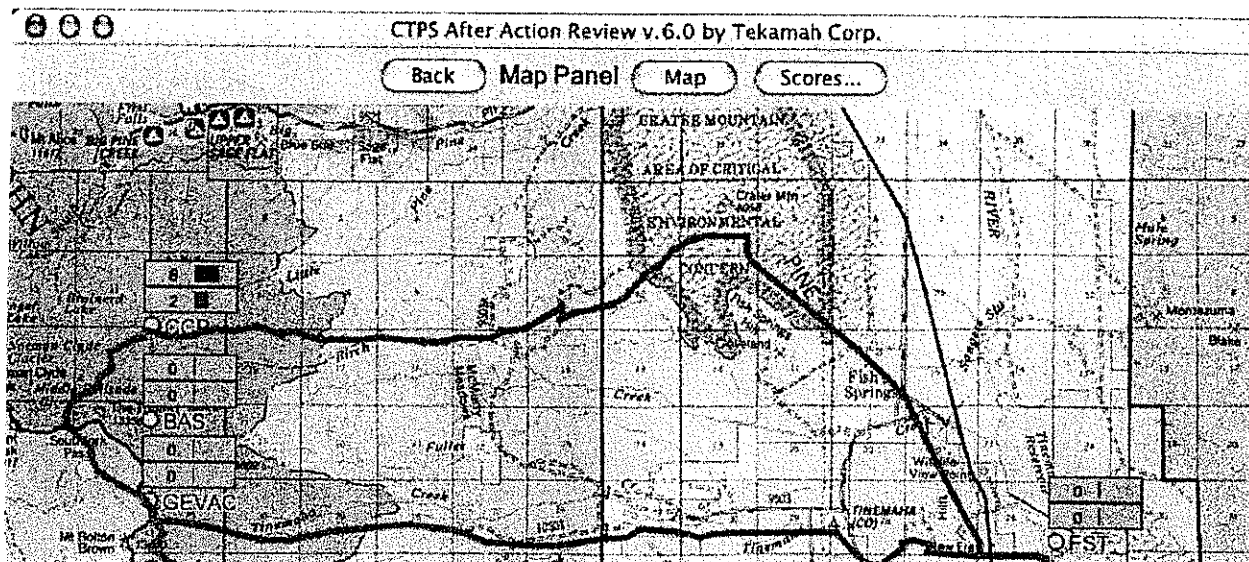
A timeline at the bottom of the various panels allows the user to select a point in time to view the simulation. Moving the pointer along the timeline, the user can see changes in the status of patients or stations in any of the views.

Two buttons at the top of the displays allow the user to move from the current panel directly to the Map Panel or to the previous panel they were viewing. The third button is the "Scores" button, used to bring up the scores calculated for this exercise.

IV.4 Map Panel

The Map Panel (Figure 13) provides a view of the battlefield and all the simulated stations including the ambulances. A graphic containing the battlefield map is displayed as a background if available from the exercise script. Stations are placed on the map in their relative positions during the exercise, but not strictly according to scale.

Figure 13. Map Panel



At the bottom of the screen is the timeline and the red diamond denotes the snapshot in time being displayed. Mobile stations (i.e. ambulances) will be seen to move as a timeline changes, based on which stationary station they are visiting.

All Participating station names and icons are clickable. Next to each symbol is a graphical and numerical display of the number of patients currently at that station and the number of patients under cardiac or respirator distress (e.g. heart rate too high or too low). The blue bar increases in size with the number of patients at the station. The red bar shows the number of patients in cardiac or respiratory distress.

The map in Figure 13 shows a Casualty Collection Point (CCP), Battalion Aid Station (BAS), Ground Ambulance (GEVAC), Field Surgical Team (FST), Combat Support Hospital (CSH) and an Air Evacuation Ambulance (AIREVAC). The bold red lines represent the routes defined for the ground ambulance by the exercise script.

IV.5 Station View Panel

The top portion of the Station View Panel (Figure 14) displays a list of all the patients in the station along with their treatment status and triage category during a point in time. Patients may be listed in as many as four columns.

At the bottom of the screen is the same timeline as under the Map Panel. At the bottom of the panel, above the timeline, is a graphical display of the number of patients at station over time. The horizontal numbers refer to the hours and minutes of the simulation over time. The vertical numbers refer to the number of patients.

At the bottom of the screen is the timeline and the red diamond denotes the snapshot in time being displayed. Mobile stations (i.e. ambulances) will be seen to move as the timeline changes, based on which stationary station they are visiting.

All participating station names and icons are clickable. Next to each symbol is a graphical and numerical display of the number of patients currently at that station and the number of patients under cardiac or respiratory distress (e.g. heart rate too high or too low). The blue bar increases in size with the number of patients at the station. The red bar shows the number of patients in cardiac or respiratory distress.

The map in Figure 13 shows a Casualty Collection Point (CCP), Battalion Aid Station (BAS), Ground Ambulance (GEVAC), Field Surgical Team (FST), Combat Support Hospital (CSH), and an Air Ambulance (AIRVAC). The bold red lines represent the routes defined for the ground ambulance by the exercise script.

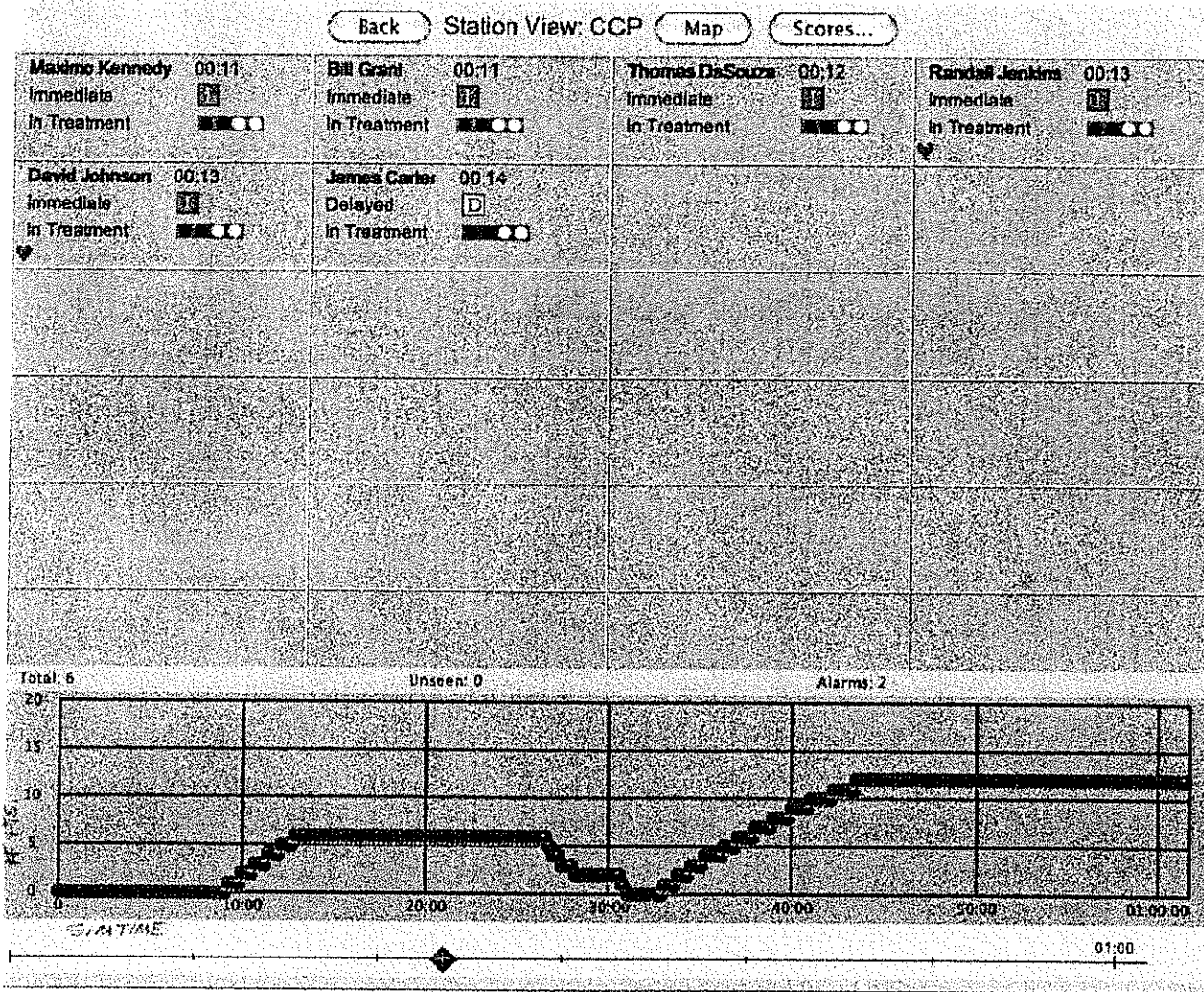


Figure14. Station View Panel

The yellow horizontal in the middle of the screen line contains summary information including

- Total number of patients at the station
- The number of patient(s) not evaluated
- Patients in medical distress

Each entry in the four column list of patients at the top of the panel shows the name of the patient, the time, in minutes, the patient as been at the station, the patient's triage category, the patient's treatment status, and a graphical representation of the patient's alarm status.

Clicking on a patient name in the list on top of the screen will bring up the Patient View panel for that patient.

IV.6 Patient View Panel

The Patient View Panel (Figure 15) shows the condition of a patient at a particular point in time and their selected vital signs over time. At the top are two panels, the first (upper left) displays basic information about the patient including his name, treatment status, triage category, and location. The second panel (upper right) displays the patient's current vital signs.

In the center of the Panel is the Patient Chart containing a text log of the treatments given to the patient.

At the bottom of the panel are selected vital signs over time. Click on the buttons to select a graphical view of the parameters (Pulse, Respiration, Oxygen Saturation, and Blood Pressure). The graphical representations act as a continuous patient monitor as these parameters are available graphically whether or not the student took the vital signs.

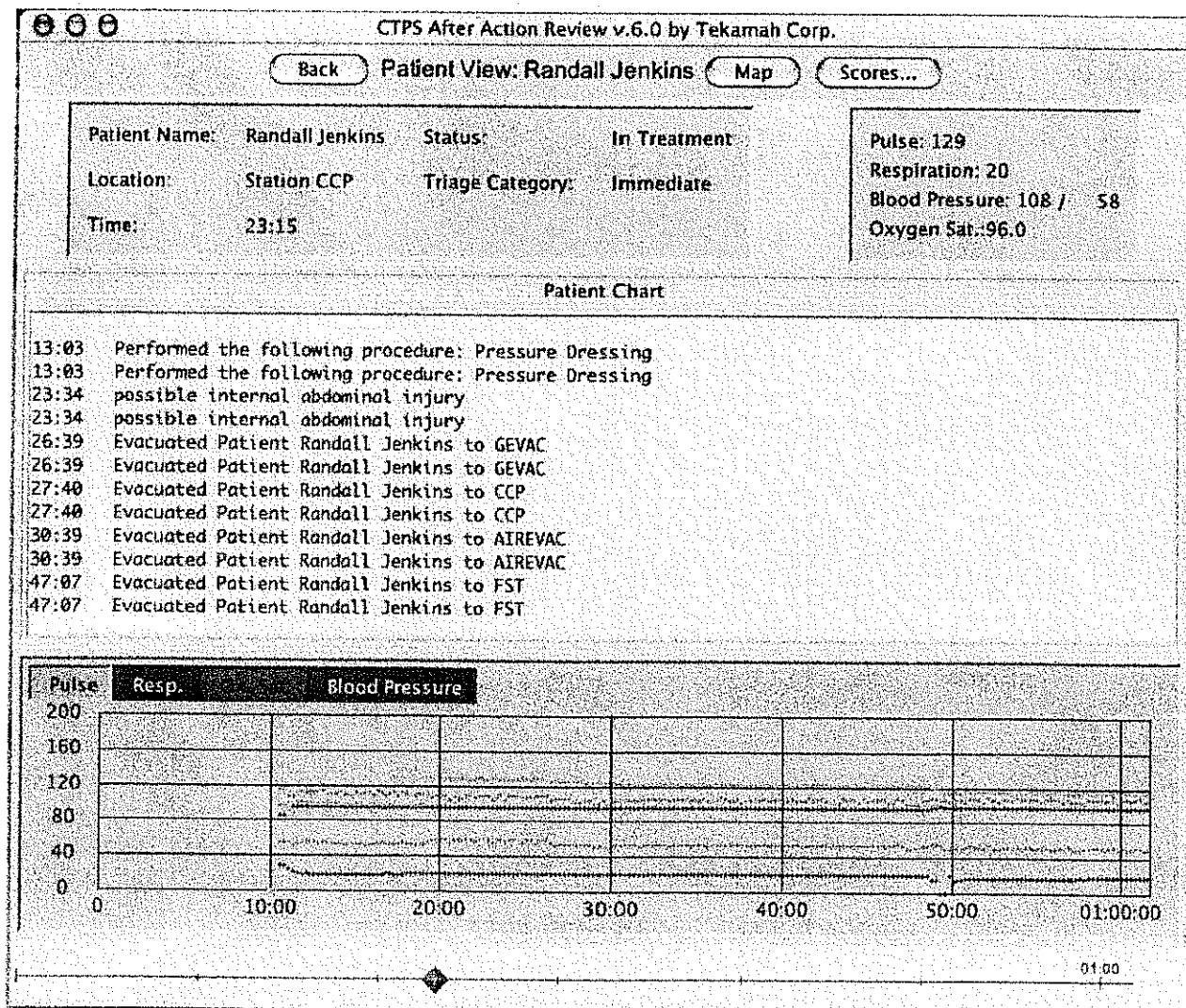


Figure 15. Patient View Panel

IV.7 Scoring

The Version 6 AAR includes the ability to automatically score the performance of the CTPS trainees. All the scores are based on how closely the students' performance compares to the performance expected by the expert who developed the specific scoring criteria for that exercise. The trainee performance data is included in the log file collected by the AARLogger. The specific scoring criteria are included in the CTPS script file used during the exercise.

The scoring algorithm in the AAR is designed to produce an *accurate* score in all cases, where accuracy is defined to mean that the closer a trainee or team comes to fulfilling the expectations of the medical expert providing the detailed scoring information for the exercise, the higher the score that will be calculated. For information regarding how the detailed scoring criteria are entered into the script, refer to the *CTPS Exercise Script Editor*.

Scores are calculated for three categories of performance:

- 1) Individual Patient Care
- 2) Patient Prioritization
- 3) Resource Management

The first score is calculated for each patient and reflects the performance of all the CTPS stations involved in treating that patient. The second score is calculated for each station and reflects how well the station prioritized the needs of the patients under its care. The third score is likewise calculated for each station and is based on the amount of critical resources used and the minimum level of the critical resources reached.

To bring up the scores calculated by the system, click on the button "Scores..." at the top of the AAR window. That will bring up the Scores Summary Dialog (see figure 15). That dialog displays the scores calculated by the system, one on each line.

The first group of scores contains the scores for the treatment of each patient in the system by all the participants in the exercise. To see the detailed calculation of the score associated with a particular patient, including an expression of how each action affected the score, click on the line containing the name of the patient and the score. That will bring up the Patient Score Detail dialog.

The Patient Score Detail dialog displays all the treatment actions that took place on the patient during the exercise. Beside the name of the action are a graphical expression of the evaluation of each action plus a comment regarding the contribution of that action to the overall score.

The second group of scores contains, for each node in the system, a score based on how well the station prioritized its treatment of the patients in its care, and a score based on how well the station managed its resources. See below for a discussion of the calculation of this score.

IV.7.a Individual Patient Care

The universe of possible actions on a patient can be divided roughly into 5 groups:

- 1) Actions that must be taken (Must action)
- 2) Actions that should be taken (Should action)
- 3) Actions that neither help nor harm (Don't care action)
- 4) Actions that should not be taken (Should-not action)
- 5) Actions that must not be taken (Must-not action)

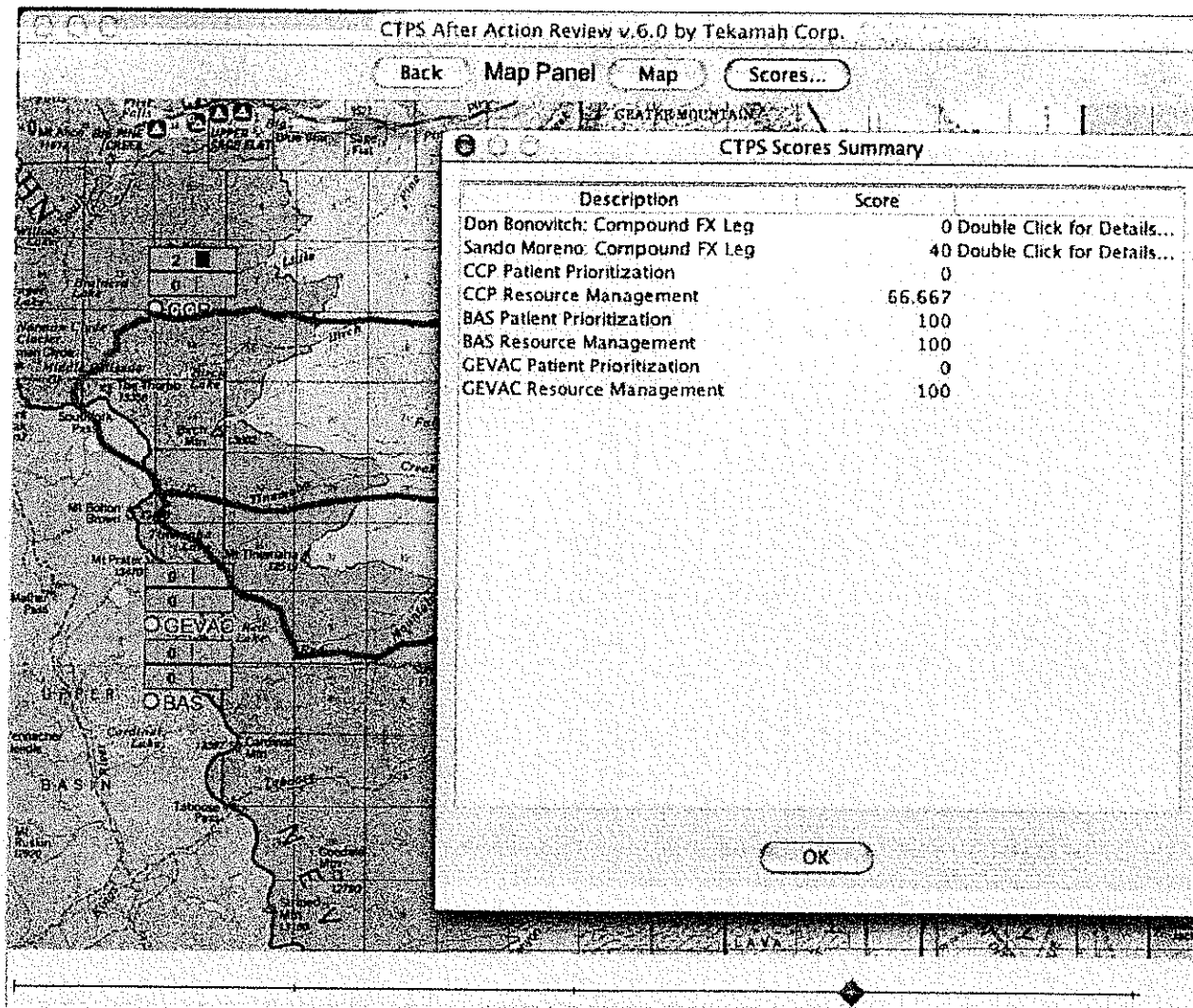


Figure 16. Scores Summary Dialog

The actions with which we are concerned are all the examination and treatment actions taken either through the Triage Controller or Emergency Care Simulator (ECS). Note that some actions taken on the ECS may require that they be duplicated on the Triage Controller in order for it to be recorded and scored by the AAR. In addition to the relative benefit or harm of the various actions, it is important for some actions that they are taken in the right order.

Even though the relative benefit and harm of actions can be expressed numerically, it is insufficient to merely apply a numerical score to each action and sum them to calculate our score for the patient: A single must-not action should result in a failing score while leaving out a single must action should likewise result in a failing score; performing all must actions and no must-not actions and no other actions should result in a low passing score. It is not possible to achieve this result by summing a simple numerical score.

Instead, the score must be calculated by including certain logic to apply a minimum passing or maximum failing score regardless of the should or should-not actions taken, as appropriate.

The formula thus looks roughly like the following:

$$S(\mathbf{A}) = \begin{cases} P + E s(a), & \text{if } \mathbf{A} \text{ contains all required must actions and no} \\ & \text{must-not actions} \\ P * (E s(a)) / (M * (n+p)) - 1, & \text{if } \mathbf{A} \text{ contains any must-not or} \\ & \text{not all must actions} \end{cases}$$

Where:

- $S(\mathbf{A})$ is the score for a series of actions
- $s(a)$ is the score for a single action a , taking into account dependency order requirements
- P is the minimum passing score (60 in current version)
- M is equal to $E s(a)$ for all should actions ($s(a) > 0$)
- n is the number of must-not actions in \mathbf{A}
- p is the number of must actions not in \mathbf{A}

The scriptwriter is responsible for identifying, using the script editor, the nature of all possible actions (a default of "neither hurt nor harm" will simplify the task) and assigning a numerical score to all should (positive scores) and should-not (negative scores) actions.

Once all must and should actions are identified, the scriptwriter must assign the order, if any, in which they must occur. Technically, he is assigning a dependency for these actions. Most actions will not be dependent on any others.

The scoring algorithm considers only whether an action was taken on a patient at any time. If an action is taken many times, it scores the same as if it were taken only once.

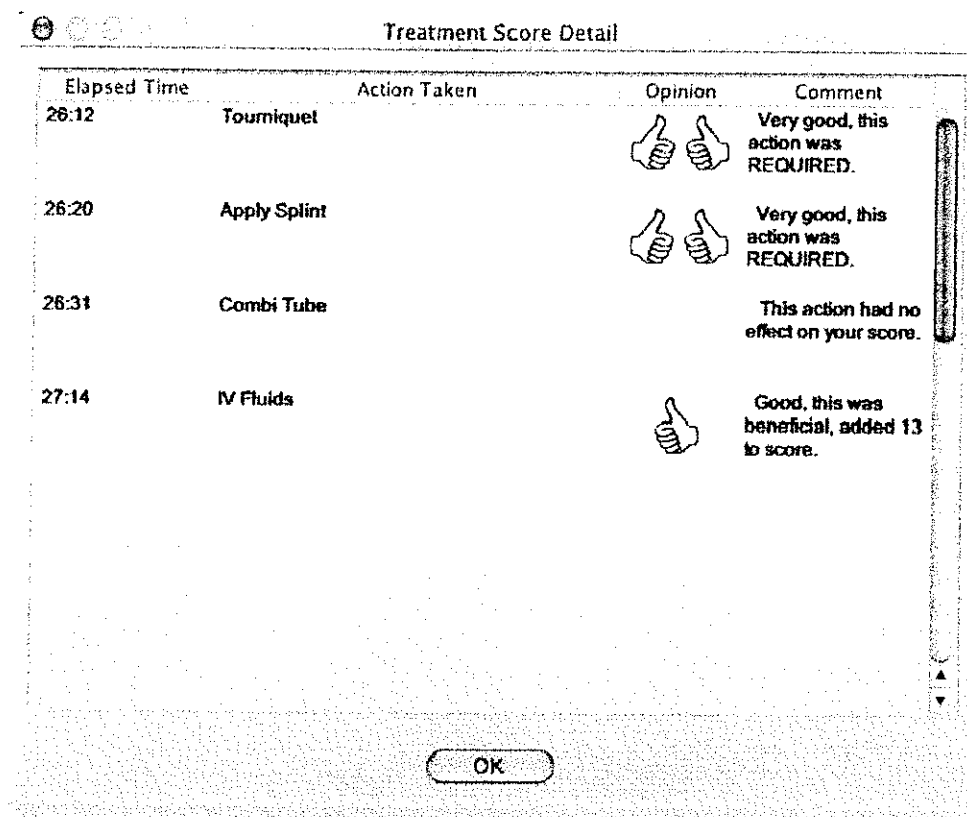


Figure 17. Patient Score Detail Dialog

IV.7.b Patient Prioritization Score

The Patient Prioritization Score attempts to measure one aspect of the management of a group of patients, in particular, the distribution of time and attention among patients.

The management of a group of patients requires the care provider to divide his time among the individuals in the group, constantly choosing which task for which patient should take priority. For instance, presented with two patients, one of which has a broken leg and another which has a severe bleed from his wrist, the care provider must first treat the severe bleed. Even though setting the leg is a correct treatment action for that patient, setting the leg when also presented with a severe bleed is a very wrong action to take.

The scriptwriter sets up the scoring for the AMS by stating the correct priority order among all the "must" actions for all the patients as if all the patients were present at the same time at the same place. This will result in a series of actions that treat one patient, then another, then another, until the first patient is treated again, and so on.

The score is calculated by subtracting an accelerating amount based on how far off is the actual sequence of actions taken from the ideal priority order (rank), that is, how severely the ideal priority order is violated. Note that if a patient is not present at a node, the actions on that patient in the ideal priority order are not considered in calculating the score. Likewise, if a patient were to appear at a node having had every necessary (must) treatment already performed on him, his treatments would not be considered while calculating the score for that node.

The formula for the score may be written as follows.

$$D(A) = E(r(a(t)) - m(t))$$

$$S(A) = 100 * (M - D(A)) / M$$

Where:

S(A) is the score for a series of actions A (as percent)
D(A) is the amount to be deducted from the perfect score
M is the maximum possible value of D(A)
a(t) is the action taken at time t
r(a) is the rank priority of a single action a
m(t) is the minimum rank of all pending and possible actions to be taken on patients at the station at time t.

IV.7.c Resource Management

Proper resource management requires not only that critical resources not be wasted but, at times, withholding treatment from an expectant or less critical patient in order to preserve a minimum level of a required resource, in case a more critical but treatable casualty appears. Thus, assessing proper resource management requires assessing:

- 1) Total amounts of critical resources used, and
- 2) Minimum levels of critical resources reached.

The scriptwriter uses the script editor to indicate the expert levels for these quantities, given all the factors involved in the simulation being scripted. The AAR notes the difference between the expert and actual quantities, sums them, and divides by the sum of the expert quantities to calculate the score.

The formula may be written as follows.

$$S = E(\max(l, e_u(r) / u(r)) + \max(l, e_l(r) / l(r))) / 2$$

Where:

S is the score for management of resources
r is a resource
e_u(r) is the expert opinion maximum level of r
u(r) is the amount of r used
e_l(r) is the expert opinion minimum level of r
l(r) is the minimum level of r

IV.8 Casualty Descriptions and Scoring Outline

Twelve soldiers were enroute to their garrison in two HUMMVs. They were driving on a dirt road when the lead vehicle ran over a mine. The explosion flipped the vehicle over, killing two of the six occupants instantly. The other four survived the initial blast but were seriously injured. The trailing vehicle immediately pulled to the side of the road and its six occupants dismounted and rushed to render assistance. Immediately after dismounting, they began to take fire from a sniper concealed in the brush adjacent to the road.

One of the members from the trailing vehicle was hit by the snipers first shot. Two others began returning fire while a fourth radioed for assistance and the remaining two (one a medic) began attending to the injured soldiers. The exchange of gunfire lasted less than five minutes before the sniper was killed. In that short time he was able to inflict two gunshot wounds, raising the number of injured soldiers to six.

IV.8.a Casualty Descriptions

IV.8.a.1 Blunt Abdominal Injury (Ruptured Spleen)

The soldier riding in the front right seat was unbelted and was thrown out of the HUMMV, landing several yards from vehicle. Upon initial inspection he has a small laceration on his forehead and reports having a sharp pain in his left wrist. He is stoic when talking about his injuries and is very concerned about his fellow soldiers. Initial vitals reveal only a slightly elevated heart rate. With further examination he is tender on the left side of his torso where he apparently struck the ground. Breath sounds are normal. Abdomen is normal.

His underlying injury is a ruptured spleen. As he bleeds into his peritoneal space he becomes increasingly hypovolemic and has rebound tenderness upon examination. Volume replacement has little effect. His only hope for survival is prompt evacuation to a treatment facility with surgical capabilities. Without surgical intervention (splenectomy) this casualty will die in approximately 60 minutes.

Table 1. HPS States - Ruptured Spleen

Baseline	30 seconds then Class I Shock
Class I Shock	450 seconds then Class II Shock
Class II Shock	450 seconds then Class III Shock
Class III Shock	2400 seconds then Class IV Shock
Class IV Shock	Death in approx two minutes
Splenectomy	

This casualty does not respond to volume resuscitation unless splenectomy is done. He transitions to "splenectomy" after arriving at a treatment facility capable of a laparotomy and surgical intervention is selected.

IV.8.a.2 Blunt Chest Injury (Pericardial Tamponade)

The blast arrested the vehicle's forward motion and flipped it over on its top. The driver's chest struck the steering wheel. Upon inspection he has a bruise on his chest over the lower half of the sternum as well as a bruise on his left leg where it struck the side of the vehicle during the rollover. He complains of soreness where he struck the steering wheel and a sharp localized pain with inspiration. As time progresses he reports the chest pain becoming "sharper" with the pain radiating to his neck. His respiratory rate increases and he has trouble breathing. He is anxious and lightheaded.

The force of the impact of his chest on the steering wheel fractured ribs immediately over his heart. The impact with the heart caused a small bleed into his pericardial sac. As the fluid accumulates his condition becomes more severe eventually leading to unconsciousness. The problem can be managed (temporarily) at any location with staff capable of a pericardiocentesis. (BAS, FST, or CSH). With the pressure in the pericardium relieved, the bleeding stops on its own and does not require surgical correction.

Table 2. HPS States - Pericardial Tamponade

Baseline	60 seconds
Tamponade	1200 seconds
Unconscious	

IV.8.a.3 Closed Head Injury

One of the soldiers riding in the rear of the first HUMMV was thrown against the metal frame of the vehicle. His head struck a metal post creating a small laceration and significant bruising. He suffered a brief loss of consciousness and reports both neck and head pain. After 5 minutes he loses consciousness.

His underlying injury is a cerebral contusion. The intra-cranial pressure increases over the course of the scenario. His best chance of survival is evacuation to a treatment facility with an intensive care unit.

Table 3. HPS States - Closed Head Injury

Baseline	300 Sec.
Unconscious	300 Sec.
Level I ICP	
Level II ICP	
Level III ICP	

IV.8.a.4 Compound Fracture of the Left Leg (Tibia)

One of the four passengers riding in the rear of the HUMMV had his left foot and ankle wedged between two pieces of gear during the rollover while his torso twisted 180 degrees. The twisting of his left leg resulted in a compound, spiral fracture of his tibia. He did not sustain any other injuries. Upon examination he has significant external bleeding. His heart rate is elevated. His pedal pulse is absent on the left but he is neurologically intact.

The fractured tibia transected the popliteal artery. Without immediate application of a pressure dressing or tourniquet, he progresses through increasingly severe states of hypovolemic shock. Once the bleeding is properly managed, he responds well to volume replacement. Vascular repair is necessary to salvage the leg.

Table 4. HPS States - Compound Fracture of the Left Leg (Tibia)

Baseline	30 seconds
Class I Shock	180 seconds
Class II Shock	300 seconds
Class III Shock	300 seconds
Class IV Shock	
Bleeding controlled	
Vascular repair	

IV.8.a.5 Gunshot Wound to the Left Chest

The sniper hit one of the soldiers in the left chest. The bullet entered in the left upper quadrant. The entrance wound is not grossly bleeding. No exit wound is found. Pulse is normal. Diminished breath sounds on the left. He remains conscious and over time begins taking more rapid, shallow breaths and complains of difficulty getting enough air. The rapid breathing is followed by tracheal deviation to the right and jugular venous distension.

The bullet missed his heart and large blood vessels but destroyed a portion of the upper lobe of the left lung leaving a significant opening between several larger bronchioles and the pleural space. Over time intra-thoracic pressure increases causing a tension pneumothorax. Treatment (needle decompression) can be done at any echelon. Once decompressed, the needle kinks or is clotted off with each transfer of the casualty to an ambulance until the needle decompression is replaced with a chest tube.

Table 5. HPS States - Gunshot Wound to the Left Chest

Baseline	30 seconds
Pneumothorax	300 seconds
Tension Pneumothorax	
Needle Decompression	

IV.8.a.6 Gunshot Wound to the Right Thigh (Femoral Artery Bleed)

The sniper's first bullet hit one of the soldiers in the left upper thigh. The entrance wound located in the high anterior-medial portion the midline is bleeding profusely. An exit wound is found on the mid-portion of the left gluteus. Popliteal and pedal pulses are absent in the injured leg. The soldier is initially coherent but becomes confused then loses consciousness as he becomes increasing hypotensive.

The bullet clipped the femoral artery. Direct pressure, a pressure dressing or tourniquet are not effective. He continues to bleed internally regardless of attempts to stop the bleeding externally and does not respond to volume resuscitation. His only chance of survival is to be evacuated to a treatment facility capable of surgical intervention (vascular repair).

Table 6. HPS States - Gunshot Wound to the Right Thigh (Femoral Artery Bleed)

Baseline	600 seconds
Class I Shock	900 seconds
Class II Shock	900 seconds
Class III Shock	
Vascular repair	

IV.8.b Evacuation Resources and Medical Treatment Facilities

The Mini CTPS System supports six possible levels of care, three of which can be used at any given point in time. Four of the levels of care represent treatment locations that are in fixed position and two represent evacuation vehicles. The four "fixed" treatment levels of care are: a Casualty Collection Point (CCP), a Battalion Aid Station (BAS), a Forward Surgical Team (FST), and a Combat Support Hospital (CSH).

The two evacuation vehicles are a ground ambulance (GEVAC) and an air ambulance (AIREVAC). The ground and air ambulances are capable of transporting four and two casualties at a time, respectively.

IV.8.c Scoring

The detailed scoring criteria associated with the exercise is contained in the following tables.

Table 7. Gunshot Wound to Chest Care Requirements

Action	Score
Needle Decompression	Must
Insert Chest Tube	50
Oxygen	10
Occlusive Dressing	10
IV Fluids	10

Table 8. Gunshot Wound Thigh Care Requirements

Action	Score
Operate	Must
Pressure Dressing	Must
Tourniquet	-50
Morphine	10
IV Fluids	25
Splint	15

Table 9. Compound Fracture Left Leg Care Requirements

Action	Score
Tourniquet	Must
Splint	Must
Operate	Must
Morphine	25
Oxygen	25
IV Fluids	25

Table 10. Blunt Chest Trauma Care Requirements

Action	Score
Pericardiocentesis	Must
Morphine	10
Oxygen	25
IV Fluids	5

Table 11. Blunt Abdomen Trauma Care Requirements

Action	Score
Operate	Must
Morphine	10
Oxygen	20
IV Fluids	20

Table 12. Head Injury Care Requirements

Action	Score
Combi Tube	Must
Cervical Collar	25
Oxygen	25
IV Fluids	25
Morphine	Must Not

Table 13. Patient Prioritization Requirements

Rank	Head	GSW Ch.	GSW Thigh	Bl. Chest	Bl. Abdomen	Cmpd. FX
1			Pressure Dsg			Tourniquet
2	Combi Tube	Needle Deco.	Operate	Pericardio.	Operate	Splint
3						Operate

Table 14. Resource Management Requirements (Max. Used/Min. Level)

Node	IV Bags	Chest Tube Kits
CCP	6/0	
GEVAC	6/0	
AIREVAC	4/2	
FST	4/50	1/7
CSH	4/50	1/7
BAS	4/50	1/8

Table 15. Resources, Treatments, and Tests

Characteristic	CCP	GEVAC	AIREVAC	BAS	FST	CSH
----------------	-----	-------	---------	-----	-----	-----

Resources

IV Bag	2	8	8	80	100	200
Saline IV	0	0	0	0	0	0
Plasma	0	0	0	0	0	0
Ringers Lactate	0	0	0	0	0	0
Blood	0	0	0	0	0	0
Chest Tube	0	4	4	10	10	50

Treatment List

Tourniquet	X	X	X	X	X	X
Needle Deco.	X	X	X	X	X	X
Pericardiocentesis				X	X	X
Operate					X	X
Pressure Dressing	X	X	X	X	X	X
Insert Chest Tube		X	X	X	X	X
Apply Splint	X	X	X	X	X	X
Intubate	X	X	X	X	X	X
DPL					X	X
Saline IV						
Plasma						
Blood						
Ringers Lactate						
Morphine				X	X	X
Diazepam				X	X	X
Atropine				X	X	X
Digoxin				X	X	X
Epinephrine				X	X	X
Verapamil				X	X	X
Oxygen		X	X	X	X	X
Cervical Collar	X	X	X	X	X	X
Combi Tube	X	X	X	X	X	X
Occlusive Dsg.	X	X	X	X	X	X
IV Fluids	X	X	X	X	X	X

Lab Tests

Chest X-Ray					X	X
Blood Gas					X	X

Simple Tests

Temperature	X	X	X	X	X	X
Oxygen Saturation	X	X	X	X	X	X
Blood Pressure	X	X	X	X	X	X

IV.9 Closing the Application

To close the After Action Review Application, click on the close symbol on the window title bar (a red circle with an "x" in it on the left hand side if running Mac OS, and a square with an "x" in it on the right side if running MS Windows).

Part V. CTPS Exercise Script Editor Application

V.1 Overview

The CTPS Exercise Script Editor allows its user to create and edit the particulars of an exercise within a series of templates that guide the user throughout the process. When a script is complete and ready to be played, the Editor supports the installation of the exercise on the computers involved in that exercise by creating an "Exercise Package". The package can then be taken to all the different computers, and, by clicking on the included Install.jar file at each one, the package will then be installed on the systems.

V.2 Main Screen

CTPS Script Editor: /Users/hps/tikrit.ctps

File Edit Create

Name:
Tikrit

Nodes:	Patients:	Treatments:	Resources:
CCP	CSW Chest	Tourniquet	Saline IV
GEVAC	CSW Thigh	Needle Decompress	IV Bag
AIREVAC	Compound FX Leg	Pericardiocentesis	Plasma
FST	Blunt Chest	Operate	Blood
CSH	Blunt Abdomen	Pressure Dressing	Lactate Ringer
BAS	Head Injury	Insert Chest Tube	Chest Tube
		Apply Splint	
		Intubate	
		DPL	
		Saline IV	
		Plasma	

Lab Tests:	Simple Tests:
Chest X-Ray	Temperature
Blood Gas	Oxygen Saturation
	Blood Pressure

Figure 18. Main Editor Screen

The main editor screen shows lists of items of an exercise that can be created or edited for an exercise.

1. Nodes
2. Patients
3. Treatments
4. Resources
5. Laboratory Tests
6. Simple Tests

In addition, from the Edit menu, the list of patient history questions and the patient prioritization or load management scoring criteria can be edited.

Double clicking on any of the items in the lists brings up a dialog or template containing all the information entered so far for that item. Clicking on an item will select and highlight it. Selecting "Delete" from the Edit menu at that time will delete the item from the lists and the script.

The Create menu is used to add new items to the script. After the template for the selected item is closed, the item's name will appear in the appropriate list on the main window.

V.3 Creating and Editing a Node or Station

All the action that occurs in a CTPS exercise happens at a virtual station or node being simulated. This simulation occurs within and at the Triage Controller responsible for simulating the station. The characteristics of each station, name, location, capacity, capabilities, and so on are determined by the CTPS Exercise script.

To edit a CTPS node, double click on its name in the list of CTPS nodes on the main window. This will bring up the CTPS Node Edit template or dialog (See Figure 19). To create a new node, select Node from the Create pull down menu.

All of the editable attributes of a node are chosen from this template. The template is divided into five subpanels. The top center panel holds just one field containing the name of the node. Enter or change the name of the node here.

The subpanel labeled "Capabilities" contains a field labeled "Capacity" and four buttons. The capacity of a node is the maximum number of patients the node may contain at one time. If a node already holds its capacity of patients, when another node tries to transfer additional casualties to the node, it will refuse them.

Clicking the button labeled "Resources" brings up a list of the resources known to the Editor and an editable field containing the number of units of that resource that the node has at the start of the exercise. Set the node's starting level of a resource by editing this field.

Clicking the buttons labeled "Treatment List", "Lab Tests", or "Simple Tests" brings up a list of the treatments, laboratory tests, or simple tests, respectively, the node is capable of applying to a patient (assuming the necessary level of resources at the time). Next to each item is a check box. Check the box next to the item to make it available at the node.

Edit CTPS node CSH

Name: CSH

Capabilities

Capacity: 50

Resource List...

Treatment List...

Lab Tests List...

Simple Tests...

Scoring

Resource Scoring...

Grid Location

33	°	15	'	0	"	<input checked="" type="radio"/> N	<input type="radio"/> S
34	°	40	'	0	"	<input checked="" type="radio"/> E	<input type="radio"/> W

Start Location:

Patient Groupings

New

Treating

Holding

Evacuate

Add Remove

Mobility

☒ Stationary

☐ Ground

☐ Air

Speed: 0 kph

Fuel Consumption: 0 kpg

Capacity: 0

Starting Level: 0

OK CANCEL

Figure 19. CTPS Node Edit Template

The subpanel labeled "Patient Groupings" contains a list of up to four patient groupings for the node. A patient grouping at a node corresponds to the physical or logical grouping of patients or casualties at a location or facility. Different facilities should have different numbers and names of groups of patients. For instance, at the Casualty Collection Point there is likely to be only one grouping-"Patients" or "Casualties". At a hospital there will be additional groupings: "Waiting to Be Seen", "Waiting for Transfer", for instance.

Using the buttons labeled "Add" and "Remove", the user can specify up to four groups of patients. The Editor requires at least one group. The default is one group labeled "Patients". If the user wishes to replace it with one labeled "Casualties", he must first add the new group before deleting the group "Patients".

When patients arrive at a node for the first time, they are placed into the first group in the list. When a patient is examined for the first time, he is automatically moved to the second group. Additional movement between groups is done explicitly by the Triage Controller operator.

The subpanel labeled "Mobility" allows the user to specify if the node moves by air, ground, or not at all. He can further specify the speed of movement, and how much fuel he uses. "Capacity" and "Starting Level" refer to the node's fuel in gallons.

The subpanel labeled "Grid Location" allows the user to enter the starting location of a node in standard latitude and longitude coordinates. The field labeled "Start Location" affects only mobile nodes and contains the static node a mobile unit starts the exercise at.

Finally, the button on the "Scoring" subpanel allows the user to enter the standards used by the After Action Review to score this station's resource management. For each resource known to the Editor, a minimum level to be maintained and the maximum amount of the resource to be used may be entered.

V.4 Creating and Editing a Patient

A patient or casualty in a CTPS exercise script is fully determined or described by three items:

1. Base Physiology contained in a physiology directory,
2. Medical Scenario to be applied contained in a scenario file,
3. Location and time the patient first appears during the exercise.

All these items can be chosen in the template brought up by double clicking on a patient in the list of patients on the main screen or by selecting Patient from the Create Menu (see Figure 20).

In addition, from the template, the user can bring up a tool for specifying how the patient should be treated during the exercise for scoring and he can list the images necessary to display the patient in the Triage Controller. A field for patient name is used to assign a name to the type of injury this patient exhibits. A commentary field allows the user to enter notes to himself or other users of the editor of teaching points or points of interest relating to this patient.

Clicking on the "Browse..." button next to the field labeled "Medical Scenario" brings up a file selection dialog allowing the user to select the file containing the medical scenario for this patient. Similarly, clicking on the "Browse..." button next to the field labeled "Base Physiology" allows the user to select the directory containing the base physiology files.

The screenshot shows a software window titled "Edit Patient GSW Thigh". The window contains several input fields and buttons. The "Name" field is "GSW Thigh". The "Commentary" field is "Describe Patient". There is an "Edit..." button next to "Scoring Script". The "Patient Placement" section has a "Place" dropdown menu set to "CCP" and a "When" field set to "0" seconds. The "Model Information" section has "Medical Scenario" set to "nshot_Left_Thigh.hs6" and "Base Physiology" set to "/Patients/Soldier.hps", each with a "Browse..." button. The "Multimedia Files" section has a large empty list box, a "Remove" button, and an "Add Images..." button. At the bottom are "OK" and "CANCEL" buttons.

Figure 20. Patient Creation or Editing Template

By listing the images necessary to display the patient correctly, the user allows the script editor and the installer to work together to assist in installing all files necessary to play an exercise on the Triage Controller computer(s). Add an image file to the list by clicking on the button labeled "Add Image...".

The user selects the location and time for the patient to first appear during an exercise by selecting the appropriate values in the subpanel labeled "Patient Placement".

V.5 Creating and Editing a Treatment

Inside the physiological model representing each patient or casualty in CTPS, treatments are applied by setting new values to patient variables within the model. How that variable is assigned is determined by the treatment's type: procedure, drug, or volume. In addition, some treatments may take a parameter, providing additional variability in how a treatment can be constructed and applied. The Triage Controller displays available treatment choices based on the body region being examined and it displays icons representing treatments already applied. Thus, the script writer must also specify body regions and icons for the treatment. Finally, some treatments may require a resource be present in order for the treatment to be applied. The Treatment Template allows the user to completely specify all these aspects of a treatment.

All treatments must have a name and a string identifier. These are entered at the top of the template along with the patient variable used to apply the treatment.

Edit CTPS Treatment: Needle Decompression

Name: Needle Decompression
 Identifier: needledecomp
 Model Variable: CTPS_PROCEDURE_NEEDLEDECOMP

Type:
☒ Procedure
☐ Drug
☐ Volume

Can be interrupted ☐
 Blocking ☐
 Time Required(secs): 0

Areas:
 Click to add/remove area treatment applies to

Homunc...	Applies To
<input type="checkbox"/>	back_arm...
<input type="checkbox"/>	front_arm...
<input type="checkbox"/>	medicine
<input type="checkbox"/>	abdomen...
<input type="checkbox"/>	_undefin...
<input type="checkbox"/>	front_leg...
<input type="checkbox"/>	front_leg...
<input type="checkbox"/>	front_pelv...
<input type="checkbox"/>	front_arm...
<input type="checkbox"/>	front_pelv...
<input checked="" type="checkbox"/>	chest_left
<input type="checkbox"/>	abdomen...
<input checked="" type="checkbox"/>	chest_right
<input type="checkbox"/>	front_ha...

Treatment Parameters:
 Add Edit

Treatment Icons:
 chest_right
 chest_left
 Add Edit

Required Resources:

Resource	Required Amt.
Saline IV	0
IV Bag	0
Plasma	0
Blood	0
Lactate Ringer	0
Chest Tube	0

OK CANCEL

Figure 5 Treatment Creating and Editing Template

In the subpanel marked "Areas", the user checks the box next to an area name to make the treatment appear in the list of available treatments when the user of the Triage Controller is examining that region of a patient assuming the station the Triage Controller represents is capable of applying that treatment.

In the subpanel marked "Required Resources", the user can cause the treatment to require and use up a given amount of a resource by entering that amount next to the resource name in the table.

Clicking on the "Add" button in the subpanel labeled "Treatment Icons" brings up a template for associating an icon with the treatment. The treatment icon template allows the script writer to specify files holding the normal and highlighted icons graphics and the location on the homunculus panel where the icons should appear.

Treatments are one of three types: Procedure, drug, or volume. Select one these three options type from the "Type" subpanel. The user may also specify how long a treatment will take, whether a treatment can be interrupted and whether it blocks other actions while the treatment is being performed.

A procedure treatment may be applied to any part of the body. The treatment is applied by setting to 1.0 the model variable specified in the corresponding field in this template. Typically, this is caught by the Scenario Processor and the medical scenario changes state as a result.

A parameter may be added to any treatment by clicking on the "Add..." button in the "Treatment Parameters" subpanel. This will bring up a template for assigning the appropriate values to the parameter.

Drugs and Volume treatments should be assigned the area "Medicine" in the Areas subpanel. A drug treatment's Model Variable field must contain the name of the drug as it is known to the physiological model.

Both drug and volume treatments must have a parameter called "Dose" that contains as its options the different dosages available. The units of the dose must be specified in the parameter template as well.

V.6. Resources

A resource is defined by its name, its units and a flag determining whether the resource is consumed when used or merely unavailable while being used. An example of a resource that is not consumed is an operating room. It becomes unavailable when used but is returned when the operation is over. All these items are entered in the Resource Template (see Figure 22).

Edit CTPS Resource: IV Bag

Resource Name: IV Bag

Units Name: bags

☒ Is consumed when used

OK CANCEL

Figure 21. Resource Template

V.7. Laboratory Tests

CTPS allows a script writer to specify laboratory tests that may be performed. The result of a laboratory test may be calculated from physiological values, it may be preset text from the patient's state, or it may be an image based on the patient's state in his medical scenario.

The Laboratory Test Template allows the user to set the type of test, and the text and image patient variables that contain the results of the test (see Figure 22). Every laboratory test has a name and identifier, these are set in the appropriately labeled fields .

In addition, if the result of the test is precalculated, that is, the result is contained in a nonphysiological variable based on the state of the patient, the laboratory test has a patient text and/or image variable. These are set in the fields marked "Model Text Variable" and "Model Image Variable", respectively.

Edit Laboratory Test: Blood Gas

Name:	Blood Gas
Identifier:	bloodgas
Model Text Variable	
Model Image Variable	

Type

☐ Precalculated Value Based on State

☒ From Physiological Variable

☐ Image Based on State

Results Physiological Model Variable Names

Label	Model Variable
O2	ppO2ap
CO2	ppCO2ap
pH	pH

Figure 22. Laboratory Test Template

The type of the test determines how the result is determined. It is set by the clicking the appropriate button in the subpanel marked "Type". If the result is a simple text string assigned within the medical scenario, then the type should be "Precalculated Value Based on State". If the result is a graphic to be displayed, the type should be "Image Based on State", and the contents of the model image variable should be set to the name of the appropriate image file by the medical scenario. Otherwise, the type is set to "From Physiological Variables".

A physiology based laboratory test produces a result in the form of a series of labeled numbers. The labels come from the strings in the column marked "Label" in the "Results Physiological Model Variable Names" subpanel. The numbers come from the contents of the variables named in the column "Model Variable".

V.8 Simple Tests

Simple tests are similar to laboratory tests but involve only a single patient variable. Their templates are likewise similar. Further, CTPS 6.0 currently supports only physiologically based tests, although the Editor allows for the creation of a simple test based on precalculated values (to allow compatibility with possible CTPS upgrades).

The name and identifier are entered in the appropriately labeled fields. The name of the physiological variable whose contents provide the value of the test result is entered in the field "Model Text Variable." (See Figure 23).

Edit Examination action: Oxygen Saturation

Name:	Oxygen Saturation
Identifier:	oxsat
Model Text Variable:	SAO2
Model Image Variable:	

Type

☒ From Physiological Variable

☐ Precalculated Value Based on State

☐ Image Based on State

Areas

Click to add/remove area treatment applies to

Homunculus Zone	Applies To
<input checked="" type="checkbox"/>	tests

OK CANCEL

Figure 23. Simple Test Template

V.9 Creating and Editing Interview (Patient History) Questions

An important part of patient examination is taking the patient's history (i.e. interviewing the patient). In CTPS, the answers to interview questions are contained in patient variables set by the medical scenario. The Editor supports the addition or editing of available history questions.

To edit the available history questions, select "History Questions" from the Edit menu. This will bring up a template containing a table with three columns (see Figure 25). The column labeled "Question" contains the questions that may be asked to take the patient history. The column labeled "Text Model Variable" contains the name of the patient variable containing the answer to the corresponding question. The column labeled "Multimedia Model Variable" contains the name of a multimedia file that may be played in response to asking the question. CTPS 6.0 does not currently support the playing of the movie file, but it is included in the Editor for compatibility with anticipated upgrades.

Text Model Variable	Multimedia Model Variable	Question
CTPS_HISTORY_WHATHAPPENED	CTPS_HISTORY_MOV_WHATHAPPENED	What happened?
CTPS_HISTORY_WHEREDOESITHURT	CTPS_HISTORY_MOV_WHEREDOESITHURT	Where does it hurt?

OK CANCEL

Figure 24. Available History Questions

V.10 Patient Scoring

The treatment of patients is scored based on how closely the CTPS exercise participants come to duplicating the care recommended by the subject matter expert-the script writer. See *After Action Review* section for details of the scoring mechanism.

To bring up the template to allow the script writer to enter the scoring criteria for a patient, click on the button labeled "Edit..." next to the "Scoring Script" label in the Patient Edit Template. This will bring up a template containing a table with three columns and two buttons labeled "Add" and "Remove".

The names of the treatment actions appear in the column labeled "Action". The column labeled "Score" contains the type ("Must", "Must Not") or score assigned to each action. Clicking on the score cell next to an action allows the user to select the type or enter the score associated with the action.

Action	Score	Dependencies
Morphine	Must Not	
Combi Tube	Must	
Oxygen	25.0	
Cervical Collar	25.0	
IV Fluids	25.0	

Buttons: Add, Remove, OK, CANCEL

Figure 25. Patient Treatment Scoring

The third column labeled "Dependencies" contains, if appropriate, a prerequisite treatment this treatment requires be done before this treatment should be performed.

Clicking on the Add button brings up a list of treatment actions. Select one and click "OK" to add it to the list of treatments for this patient. Select a treatment action from the table and click "Remove" to remove it from the list of treatments for this patient.

V.11 Patient Prioritization

The treatment of multiple patients requires the participants in a CTPS exercise to divide their attention and time among all the patients present at any one time. The AAR scores this based on a priority listing of the patients and treatments they should receive. This priority listing is created in the Editor.

Select "Load Management Score" from the Edit menu to bring up the template used to select the priorities of treatments and patients (see Figure 26). This template contains a table with a column labeled "Rank" and columns for each patient.

Rank	Head Injury	GSW Thigh	GSW Chest	Blunt Chest	Compound FX Leg	Blunt Abdomen
1		Pressure Dressing			Tourniquet	
2	Combi Tube	Operate	needle Decompress	Pericardiocentesis	Apply Splint	Operate
3					Operate	
4						

Insert Rank
Move Actions

OK CANCEL

Figure 26. Patient Prioritization Template

The rank of an action determines its placement in the priority list. Rank one actions should occur before rank two actions, and soon. *Only Must actions appear in the patient treatment priority ordering.* When new patients are created and their individual treatments are scored, all the actions are first assigned the same rank.

To add additional ranks, select a rank row in the table, then click the "Insert Rank" button. An empty rank row will be added above the selected row. To place actions into a rank row, select the cells holding the actions to be moved to the desired rank, and click the button "Move Actions", then click on the cell holding the rank number you want the actions to be moved to.

V.12 Creating or Editing a Map

A map can be associated with a CTPS Exercise through the Editor. The map will appear in the CTPS AAR application when the exercise is reviewed. The map is specified by selecting the maps boundaries, an image for the map, and by drawing the routes on the map available to ground transportation.

To bring up the Map Creation and Editing Template, select "Map Design" from the Edit menu (see Figure 27). The map's boundaries are entered as latitude and longitude in the appropriate fields at the top of the template.

The button labeled "Image..." allows the user to select a graphic file holding the image of a map. The map image will be displayed in the scrollable viewer in the middle of the template.

The routes available to ground transportation are listed in the Routes subpanel . Add a route by clicking on the "Add" button. Then trace your route on the map, clicking as the route changes direction or turns. At the end, double click. Enter the name for the route into the dialog that appears. The new route will appear on the map, and its name will appear in the route list.

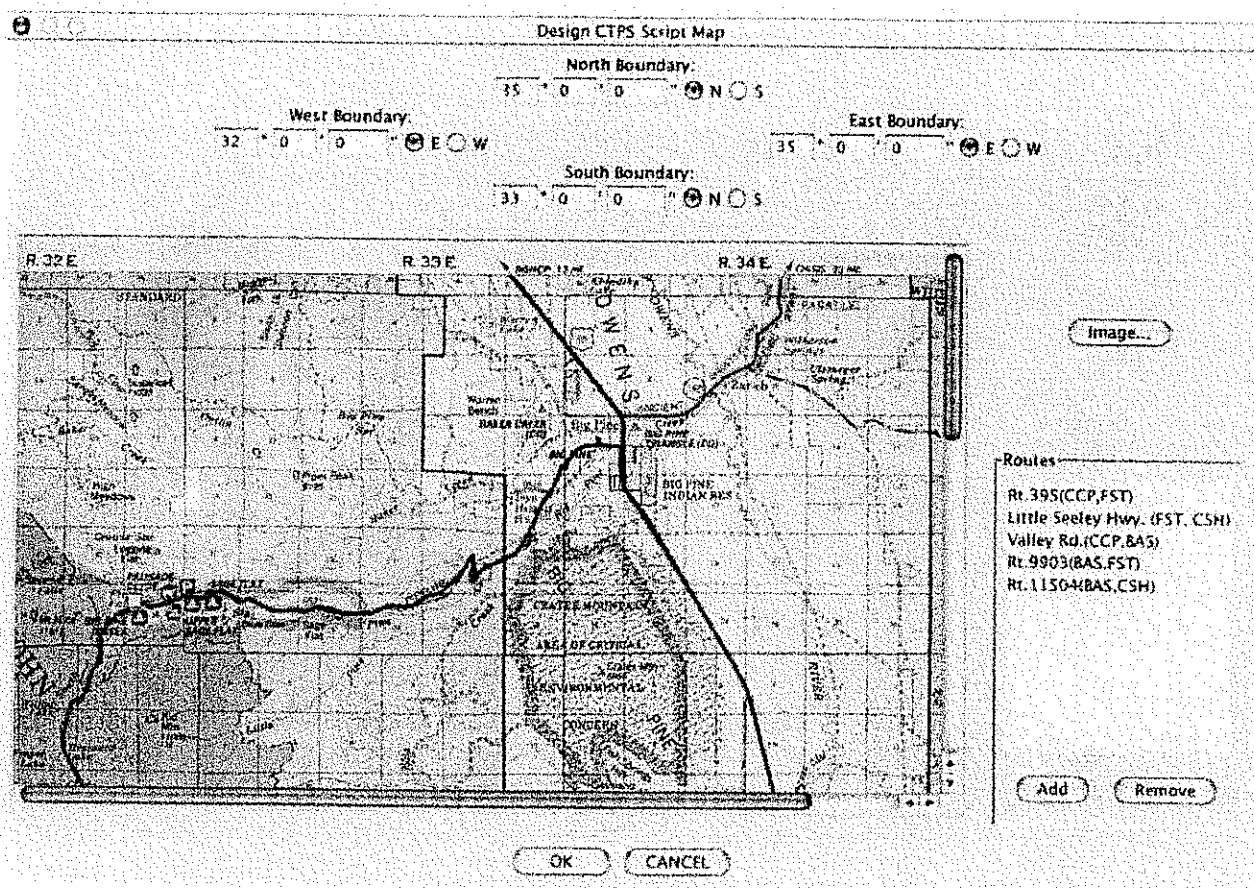


Figure 27. Map Design

V.13 Preparing to Install an Exercise

When an exercise editing session is over, the user should save it by selecting "Save" from the File menu.

Before an exercise can be used, it must be installed on the computers participating in the exercise. To make a script ready for installation, select "Create Package" from the File menu, then select a directory to contain the installation package to be created. The installation package will be a directory with the name of the exercise, created inside the directory chosen by the user. This directory contains all the files necessary to install the exercise on the computers that make up the CTPS system.

Transfer the package to each of the computers participating in the training session or exercise over a network or by compact disk or other means. Inside the package is the application Install-jar. Click on this application and follow the instructions.

When installing to a computer running a Triage Controller, directories with the names of the simulated stations will be created inside a directory with the name of the exercise, which is created in the directory chosen by the user during installation. The directory with the name of the station to be simulated by the computer contains the patient image files listed in the script. These files must be copied to the directory holding the Triage Controller application before running the script.

Part VI CTPS Casualty Handler Engine

VI.1 Overview

The Casualty Handler Engine is the central server component to the entire CTPS system. All requests to start, stop, or move patients or change any of the physiologic parameters are handled by the Casualty Handler Engine. The following diagram shows the network architecture of the system with the Casualty Handler Engine as the central HUB. The Casualty Handler Engine's main purpose is to track which PATSIM each casualty is on and to redirect any requests for patient information or access to the appropriate node (Figure 28).

Current Architecture (Single Node)

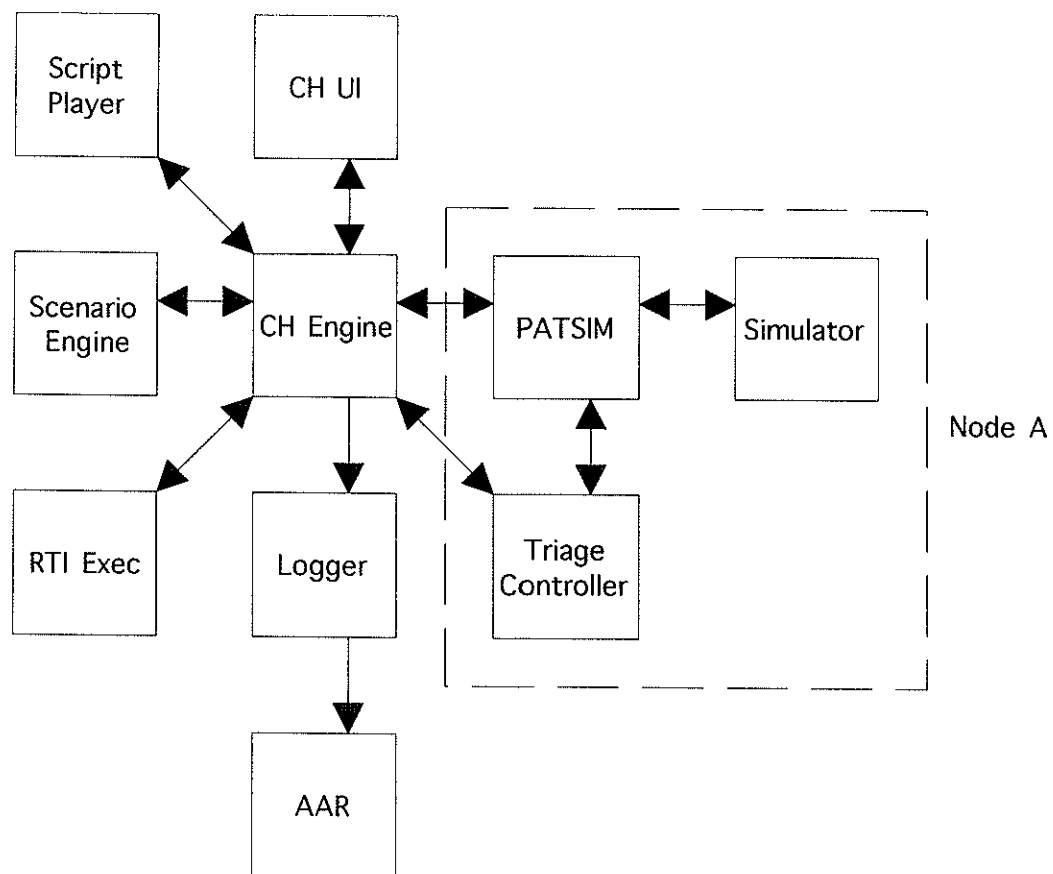


Figure 28. Single Node Architecture

VI.2 Starting the Application

The Casualty Handler Engine is started upon login to the dual processor G5 master workstation.

VI.3 Screen Information

Currently, text output is displayed only as a guideline that system is functioning. The exact messages are useful for support purposes but not in every day use. For the most part the Casualty Handler Engine is a component that should run in the background.

VI. 4 CTPS Casualty Handler User Interface

The Casualty Handler User Interface is the instructor's interface to the CTPS system. This allows the instructor to move patients to different nodes or to change the physiologic parameters. The User Interface works in conjunction with the Casualty Handler Engine to allow the Instructor to modify any parameter or scenario in the system. The Casualty Handler User Interface functions almost entirely like an HPS 6.3 remote control. The only difference is an additional tab in the connection drawer that allows an instructor to transfer a patient to any of the nodes.

VI.4.a Starting the Application

The application resides on the Instructor's Remote Control and is started with an icon in the dock.

VI.4.b Screen Information

The screen very closely resembles the HPS Version 6.3 User Interface screen with only the addition to the connection drawer. All information available in the HPS Version 6.3 User Interface is available with the Casualty Handler User Interface as well.

Part VII. Mini-CTPS: Glossary of Terms

General

Casualty - a computer-modeled patient being simulated within the context of the Mini-CTPS system.

CTPS - Combat Trauma Patient Simulation

IBook - an all-white laptop computer used to run the *Triage Controller* application software.

PowerBook G 4 - a silver-colored laptop used to run the *PatSIM* patient simulation software.

PowerMac - a more powerful, tower-style computer, used to run the *Casualty Handler* and *Scenario Processor*. This type of computer is also used to run the *CCP* node, which - due to the number of simulated patients which run on it simultaneously -- requires more processing capability.

PCU - Power and Communications Unit - the hardware interface which sits between the mannequin and the computer that controls it (the *PatSIM*). The PCU supplies the mannequin with compressed gases, as well providing a wireless communications signal, through which the *Triage Controllers* can operate.

TDCK - Trauma Disaster Casualty Kit - an add-on providing the ability to use fluids (such as water or simulated blood) in conjunction with the ECS mannequins.

Levels of Care ("Nodes")

AIREVAC	Air Evacuation ambulance
BAS	Battalion Aid Station
CCP	Casualty Collection Point
CSH	Combat Support Hospital
FST	Forward Surgical Team
GEVAC	Ground Evacuation ambulance

Applications

AAR - After Action Review - Analyzes a Mini-CTPS simulation session after it has been finished. Can graphically display casualty physiology and resource utilization over time, from either the level-of-care or casualty point of view. Uses the log file generated by the *AARLogger* as its data source.

AAR Logger - After Action Review Logger - Records data pertaining to the entire Mini-CTPS simulation session. Generates a log file, which can later be analyzed by the *AAR*. Other than starting it up, there is no need to interact with it directly.

Casualty Handler - A core part of the Mini-CTPS system used to create new casualties; also acts as a central information repository for the *AARLogger*. Other than starting it, there is no need to interact with it directly.

Casualty Handler User Interface - A computer application through which an instructor can observe and manipulate casualties within a Mini-CTPS simulation session. Uses a special, CTPS-Edition version of the *HPS software*, and runs on the *Master Workstation*.

CTPS Player - The "traffic controller" for the Mini-CTPS System; directs the creation of new casualties by the *Casualty Handler* at a particular level of care (usually the CCP). Such casualties are automatically created according to the schedule as set by the *CTPS Exercise Script Editor*. The CTPS Player also allows the instructor to manually insert new patients (casualties) into the simulation.

CTPS Exercise Script Editor - Gives the instructor the ability to customize existing and/or create new Mini-CTPS simulation exercises. Includes the ability to edit available nodes, casualties (referred to as "Patients"), treatments, resources, and tests. Creates the "Exercise Package", which the *CTPS Player* uses to drive a Mini-CTPS simulation session.

Scenario Processor - Used to modify the physiology of casualties after they have been created by the *Casualty Handler*. It is the Scenario Processor that causes casualties within the Mini-CTPS simulation to degrade over time or as the result of user interventions.

PatSIM - Simulates the physiology of all patients located at a particular level of care. Aspects modeled include calculation of current heart rate, cardiac output, blood pressure, blood gases, hematocrit values, lung volumes, respiratory rate, drug effects and other physiologic parameters.

Triage Controller - The user interface through which students triage casualties at each level of care. Utilizes data from, and controls, a corresponding PatSIM. Sometimes referred to as "TC" for short. The Triage Controller is also how casualties are moved onto the mannequin for hands-on diagnosis and interventions.

Waveform Display - Emulates a physiological medical monitor, including the heart rate, blood pressure and oxygen saturation. Part of the standard METI ECS simulation product line.